

A black and white photograph of a pine forest. In the foreground, a man in a light-colored shirt and dark pants stands looking towards the right. In the background, a logging operation is visible with a tractor, a person, and a stack of logs. The title "GEORGIA'S TIMBER, 1972" is printed in large, bold, white capital letters across the upper middle of the image. The signature "J. Perry" is in the top right corner.

GEORGIA'S TIMBER, 1972

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USDA
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USDA Forest Service Resource Bulletin SE-27, "Georgia's Timber, 1972," by Herbert A. Knight and Joe P. McClure.

Please make the following changes in this Bulletin:

Page 19, QUALITY OF TIMBER LIMITS UTILIZATION, last sentence in first paragraph should read: "Such residual conditions also fostered wildfire, disease, insects, and other damaging agents. "

Page 39, Table 16. Table title should read: "Net annual growth and removals of growing stock on commercial forest land, by species, Georgia, 1971."

Thank you.

Foreword

This report presents the principal findings of the fourth Forest Survey of Georgia's timber resource. The survey was started in June 1970 and completed in November 1972. Three previous surveys, completed in 1936, 1953, and 1961, provide statistics for measuring changes and trends over the past 36 years. In this report, however, the primary emphasis is on the changes and trends since 1961.

More detailed data, including many county tables, are found in five Survey Unit reports issued as the survey progressed through the State. Copies of these reports can be obtained from the Southeastern Forest Experiment Station. The Georgia Forestry Commission at Macon, Georgia, has been provided with summary data cards which enable the State to prepare special compilations and reports of the basic statistics for groups of counties. Finally, a Forest Information Retrieval (FIR) service is available at the Southeastern Station for compiling Forest Survey statistics for any geographic area within the Station territory.

Forest Survey, authorized by the McSweeney-McNary Forest Research Act of 1928, is a continuing nationwide undertaking by the regional experiment stations of the Forest Service, USDA. In Florida, Georgia, North Carolina, South Carolina, and Virginia, Forest Survey is a research activity of the Southeastern Forest Experiment Station, with headquarters at Asheville, North Carolina. The objective is to periodically evaluate the

present and prospective timber resource situation. Basic data are obtained from an inventory of the forest lands, their extent, condition, volume of timber, and rates of timber growth and depletion. This evaluation helps provide a basis for the formulation of forest policies and programs.

Georgia is one of the Nation's leading forestry states in forest area, timber supply, timber product output, and other forest values. Present concern and debate over timber supplies, timber demands, timber prices, and the forestry resources in general make the new Survey findings especially timely.

The combined efforts of many people have gone into the Forest Survey in Georgia. Appreciation is expressed to all project and Station personnel who participated in the field and office work. Special appreciation is also expressed for the excellent cooperation of the forest industries, other private landowners, and public agencies in providing information and access to the sample locations. The Southeastern Station also gratefully acknowledges the cooperation and substantial assistance provided by the Georgia Forestry Commission and Georgia Forest Research Council.

Finally, the discussion of other recognized forest values in Georgia—water, fish and wildlife, naval stores, and recreation—is beyond the scope of this report. The purpose of this publication is to appraise the timber situation.



ROBERT G. McALPINE, Assistant Director
Southeastern Forest Experiment Station

The authors wish to express their thanks to Mr. Ollie L. Knott, Jr., of the Georgia Forestry Commission for providing the cover photograph and illustrations on pages 4, 10, 16, 21, and 27.

GEORGIA

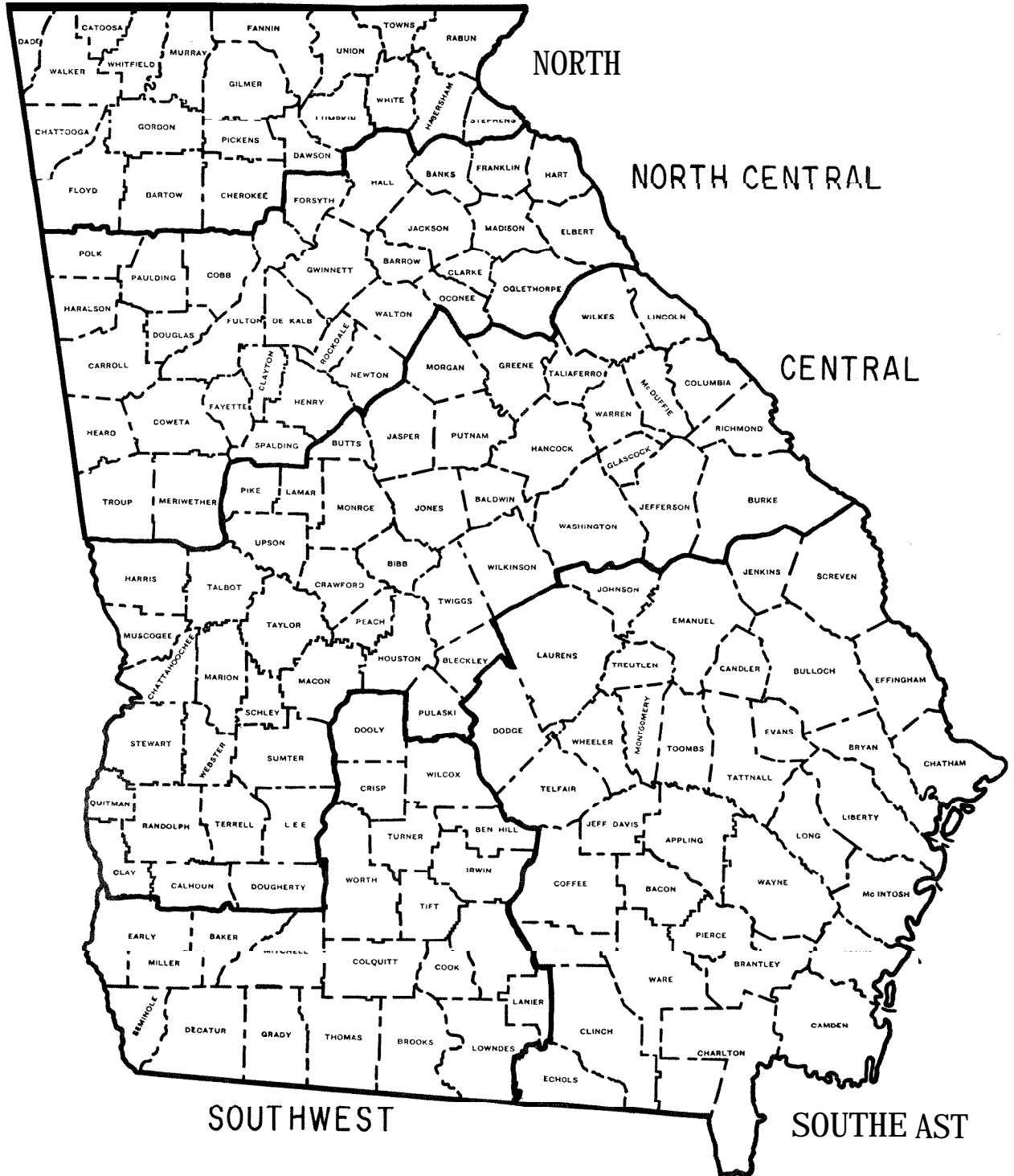


Figure 1. — Forest Survey Units in Georgia.

GEORGIA'S TIMBER, 1972

by

HERBERT A. KNIGHT, Resource Analyst

and

JOE P. McCLURE, Principal Resource Analyst

Highlights

Since the third Forest Survey in Georgia was completed in 1961—

-area of commercial forest land has decreased from 25.8 to 24.8 million acres, or by 3.7 percent. This net decrease masks land-use changes which occurred on more than 3 million acres. About 2 million acres of commercial forest were diverted to nontimber uses, and more than 1 million acres of new forest were added. With 66 percent of its total land area in commercial forest, Georgia still has more timberland than any other state in the Nation except Oregon.

-area of commercial forest land classified as farmer-owned has declined from 15.0 to 8.4 million acres, or by 44 percent. Although a large share of the forest diversion occurred in this ownership class, most of the decline is attributed to land transactions and changes in owner occupations. Miscellaneous private holdings soared from 4.9 to 10.5 million acres, and forest industry lands increased from 3.9 to 4.3 million acres. Except for the withdrawal of 0.3 million acres of wetlands in the Okefenokee National Wildlife Refuge, there has been little change within the public ownerships, which total 1.6 million acres.

-volume of growing-stock timber has increased from 19.6 to 25.3 billion cubic feet, or by 29 percent. Almost 80 percent of this increase occurred in the piedmont and mountains and is largely attributed to the high proportion of young sapling stands which grew to pole timber size during the period. Two species, loblolly pine and slash pine, accounted for more than half of the net gain in volume across the State. The 1972 inventory included 72.2 billion board feet of sawtimber.

-heavy timber harvesting coupled with extensive tree planting, stand conversion, and other forestry activity have created a rather delicate timber supply situation in a group of counties south of the Altamaha River in Southeast Georgia. This was the only extensive area found where annual removals were exceeding growth. Almost 40 percent of the softwood removals came out of the Southeast Survey Unit in 1971. Some 1.6 million acres, or about half of all the plantations, have been established in this Unit; however, 70 percent of these planted stands is less than 15 years old.

-the rate of net annual growth has increased by 50 percent to an average of 63 cubic feet per acre of commercial forest. This represents a record statewide average

for the Southeast and is attributed to high ingrowth, improvement in stocking, better protection, and more intensive timber cultural practices. In 1971, net growth of growing stock totaled almost 1.6 billion cubic feet and included more than 5.2 billion board feet of sawtimber. Annual growth loss to mortality has declined from 15 to 9 percent.

have been harvested, thinned, cleared, or otherwise cut into annually. In 1971, removals of growing stock totaled just over 1.0 billion cubic feet and included 3.7 billion board feet of sawtimber. About 75 percent of this volume removed was converted into timber products, 12 percent was left in the woods in the form of logging residue, and the remaining 13 percent was attributed to cultural practices, land clearing, and other land-use changes where the timber was not used. Pulpwood is the leading timber product in terms of volume and accounted for 55 percent of the total roundwood output in 1971.

-more than 1.7 million acres, or 7 percent of the commercial forest land, have been planted or artificially regenerated. This brings the total area planted or seeded

up to 3.2 million acres. With most pine plantations likely to be harvested within 30 years of their establishment conceivably, a third or more of the pine cut in Georgia could be coming from plantations by 1985.

-about half of the land classified as commercial forest has been treated or significantly disturbed. Differences were observed, however, in the occurrence of treatment or disturbance among the broad management and ownership classes. Only about 41 percent of the stands occupied with pine forest types in 1972 had gone untreated or undisturbed, compared to 58 percent for the stands occupied with hardwood types. By broad ownership class, the highest rate of treatment and disturbance was observed on forest industry lands and the lowest rate on public lands.

-the overall outlook for future timber supplies has improved. For example, a projection based on the 1961 conditions estimated that the prospective available cut could increase to 1.3 billion cubic feet annually by 1990. A similar projection based on the 1972 condition suggests that the prospective available cut could increase to more than 1.7 billion cubic feet annually by the end of this century.



Timber Trends

AREA OF COMMERCIAL FOREST DECREASING

Georgia, with 24.8 million acres of commercial forest, has more timberland than any other state except Oregon. Georgia is also a major agricultural state and since the early thirties the Forest Survey has monitored changes in land use back and forth between forest and agriculture. For at least three decades, the natural reforestation of idle and abandoned agricultural lands, along with extensive tree planting on open areas, more than offset all diversions of forest to other land uses. These changes eventually added some 4.5 to 5.0 million acres to the area classified as commercial timberland.

As additions of new forest land diminished and the rate of forest diversion accelerated, the forest base began to recede across the entire State. Between 1961 and 1972, the net loss of commercial forest land totaled almost 1 million acres, or 3.7 percent. There was a net decrease in each of the five Survey Units (fig. 1).

This net decrease of slightly less than 1 million acres in Georgia's timber base over an 11-year period masks land-use changes on more than 3 million acres of land. About 2 million acres of commercial forest were diverted to nontimber uses, and more than 1 million acres of new forest were added. A further description and breakdown of these changes by Survey Unit adds resolution to the overall land-use picture (table I).

Tree planting on open lands accounted for about 43 percent of the forest additions. Most of the remaining additions resulted from the natural reversion of idle lands, and therefore did not represent any planned or direct forestry investment on the part of the owners or land managers. Because idle agricultural land is the primary source of prospective forest additions, a downward trend in idle land suggests that there will be less opportunity in the future for adding forest acres. For example, the area of idle agricultural land in Georgia has decreased from 2.1 to 0.7 million acres within the past 20 years.

The withdrawal of more than 325,000 acres in the wetlands' portion of the Okefenokee National Wildlife Refuge in Southeast Georgia from commercial forest explains a significant part of the overall reduction in the timber base. Commercial timber harvesting is no longer permitted on these lands; therefore, they were reclassified to productive-reserved forest in the 1972 Forest Survey. Similar withdrawals of this magnitude are not anticipated.

Altogether, the clearing and diversion of commercial forest to agricultural use removed some 956,000 acres from the forest base. More than half of the diversion to agricultural use was to pasture, a common land-use change observed throughout the State. About 420,000 acres of the diversion was to cropland, largely concentrated in the coastal plain. Relatively little cropland was added in the Piedmont and mountains. Additional diversions of forest land to agricultural uses are probable.

The diversions to urban and other uses totaled almost 610,000 acres. This broad use class includes home sites and residential development, roads and highways, utility rights-of-way, and a host of other miscellaneous land uses which are rather permanent in nature. More than a third of these diversions occurred in the North Central Unit, which includes the Atlanta Metropolitan Area. Although Georgia's population has been growing at an average rate of 65,000 people annually in recent years, how the population disperses is more important than changes in the population itself from the standpoint of land-use impact. While most of the direct impact of the interstate highway system on the land-use pattern has already been absorbed, there is a proposal to extend the Blue Ridge Parkway into Georgia. If this extension materializes, a significant number of forest acres will be involved.

Although most of the large water impoundments which exist in Georgia were created prior to 1961, construction of new lakes and ponds flooded an estimated 83,000 acres previously classified as forest.

Table I. — Changes in area of commercial forest land, by Survey Unit, Georgia, 1961-1972

Survey Unit	Area of commercial forest land in:		Net change	Changes							
	1961	1972		Total gain	Additions from:		Total loss	Diversions to:			
					Non-forest	Noncommercial forest		Noncommercial forest	Agri-culture	Urban and other	Water
..... Thousand acres											
Southeast	7,945.0	7,440.6	-504.4	201.5	201.5	—	705.9	335.8	221.3	129.7	19.1
Southwest	3,064.5	2,884.8	-179.1	1	R6.4	186.4	—	366.1	12.8	294.4	45.8
Central	7,416.6	7,321.9	• 94.1	250.0	249.0	1	0	344.7	3.9	203.1	110.4
North Central	4,084.6	3,999.2	• 85.4	287.9	287.9	—	373.3	1.9	140.8	215.8	14.8
North	3,277.4	3,192.5	• 84.9	130.7	128.2	2.5	215.6	1.7	97.0	107.8	9.1
State	25,788.1	24,839.0	-949.1	1,056.5	1,053.0	3.5	2,005.6	356.1	956.6	609.5	83.4

In summary, most of the land-use trends point to a further reduction in commercial forest land in Georgia. Similar trends prevail throughout much of the Nation.

SHARP DECLINE IN FARM WOODLAND

The area of commercial forest land classified as farmer-owned has declined from about 15.0 to 8.4 million acres, or by 44 percent. Although a large share of the forest diversion occurred in this ownership class, most of the decline is attributed to land transactions and changes in owner occupations. Undoubtedly, some inconsistency between surveys in the classifications of forest owners is also involved but not to the extent that would greatly distort the measure of real change. The fact remains that the greatest change in the forest ownership pattern in Georgia between 1961 and 1972 occurred in a real shift from farmer to miscellaneous private.

Most of the loss in farmer-owned forest land does show up as a gain in the miscellaneous private owner class where area of commercial forest soared from 4.9 to 10.5 million acres. Miscellaneous private owners now control more of Georgia's timberland than any other class of owner.

Other changes in forest ownership include a g-percent gain in forest industry lands, which increased from 3.9 to 4.3 million acres. In addition to these fee-simple holdings, forest industries have almost a million acres of commercial forest under long-term lease. In most of the tables by ownership in this report, the statistics on these leased lands are included with the actual owner class. A compilation of the Statewide statistics is available, however, where the leased lands are treated as a separate ownership class.

Except for the withdrawal of the wetlands' portion of the Okefenokee National Wildlife Refuge, there has been little change within the public ownership pattern. Only about 1.6 million acres, or 6 percent, of the commercial forest land is publicly owned. More than half of these publicly owned timberlands are on the Chattahoochee and Oconee National Forests. Other large public holdings of commercial forest land include the Fort Stewart, Fort Benning, and Fort Gordon military reservations; Waycross State Forest, Piedmont National Wildlife Refuge, and lands around the major reservoir constructed by the Corps of Civil Engineers.

BUILDUP IN TIMBER INVENTORY ACCELERATES

The inventory of growing-stock timber on commercial forest land increased from 19.6 to 25.3 billion cubic feet, or by 29 percent, between 1961 and 1972. This means that the rate of increase in timber volume accelerated in spite of the reduction in forest area (fig. 2). This sizable buildup in timber inventory is largely attributed to the high proportion of young stands which grew from sapling to pole timber size during the period. In 1972, sapling and seedling stands occupied 2.5 percent of the commercial forest, as compared to 45 percent in 1961.

This buildup in timber inventory has not been uniformly distributed across the State. Almost 80 percent of the volume increase since 1961 has occurred in the piedmont and mountains. By Forest Survey Unit, the increase ranged from a low of 9 percent in Southeast Georgia to a high of 58 percent in North Central Georgia.

Two species, loblolly pine and slash pine, accounted

for more than half of the total net gain in volume. Generally, forest managers have favored loblolly and slash pine over all other species in timber cultural activities. This has been especially true in artificial reforestation. Substantial increases in volume were also found in most of the oaks, sweetgum, and yellow-poplar. Smaller increases in volume occurred in such major species as shortleaf pine, blackgum, hickory, and red maple. Volume in longleaf pine, cypress, and ash declined slightly.

Current volume equations and merchantability standards were applied to stem counts made in the previous surveys to provide a basis for valid comparisons in volume. This means that the volumes published previously have been adjusted, and changes between surveys are based on changes in numbers of trees by size classes.

Although this analysis of volume trends is based on cubic feet of all growing-stock trees 5.0 inches d.b.h. and larger, changes in the volume of sawtimber trees follow a similar pattern. The 1972 inventory included 72.2 billion board feet of sawtimber.

TIMBER SHORTAGE IDENTIFIED IN SOUTHEAST GEORGIA

The only extensive area within the State which experienced a reduction in timber volume was a group of counties south of the **Altamaha** River in Southeast Georgia.

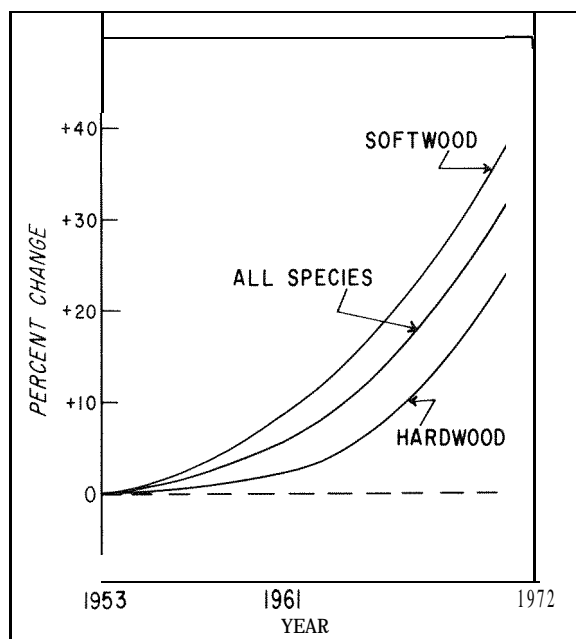


Figure 2. — Percent change in the volume of growing-stock timber in Georgia since 1953.

Unusually heavy timber harvesting in this area, coupled with extensive tree planting, stand conversion, and other forestry activity, have created a rather delicate timber supply situation in which removals are exceeding growth. One of the heaviest concentrations of wood-using industry in the South is found in and around this area. Almost 40 percent of the softwood timber removals from Georgia's commercial forests came out of the Southeast Unit in 1971 (fig. 3). **Stumpage** prices are higher in this area than in any other part of the State, reflecting the higher demand.

The Survey findings suggest that forest industries drawing timber from this area will need to search out other sources of supply while awaiting young stands to reach merchantable size. Some 1.6 million acres, or about half of all the plantations in the State, have been established in Southeast Georgia. Seventy percent of these planted stands, however, is less than 15 years old.

GROWTH RATE UP 50 PERCENT

Net annual growth has responded to an improvement in stocking, better protection, and more intensive timber cultural practices to a point where growth exceeds annual removals by 55 percent (fig. 4). In 1971, net growth of growing stock totaled almost 1.6 billion cubic feet and included more than 5.2 billion board feet of sawtimber. This means that net growth averaged about 63 cubic feet per acre of commercial forest, or roughly 50 percent better than the growth rate determined in the 1961 Survey.

As in the case of inventory volume discussed earlier in this report, the growth rate and other components of change varied considerably by species and Forest Survey Unit (table II). For example, the margin of growth over removals ranged from a low of 12 percent in Southeast Georgia, to a high of 108 percent in North Central Georgia. When expressed as a percent of inventory, net growth of softwoods averaged 7.8 percent in 1971 for the State as a whole, compared to only 4.0 percent for hardwoods.

The remeasurement of permanent sample plots provided data for a detailed breakdown of gross growth into its various components. Survivor growth, the volume increment of growing-stock trees 5.0 inches d.b.h. and larger in the inventory at the beginning of the year and still in the inventory at the end of the year, accounted for 78 percent of the gross growth. **In-growth**, the net volume of growing-stock trees reaching

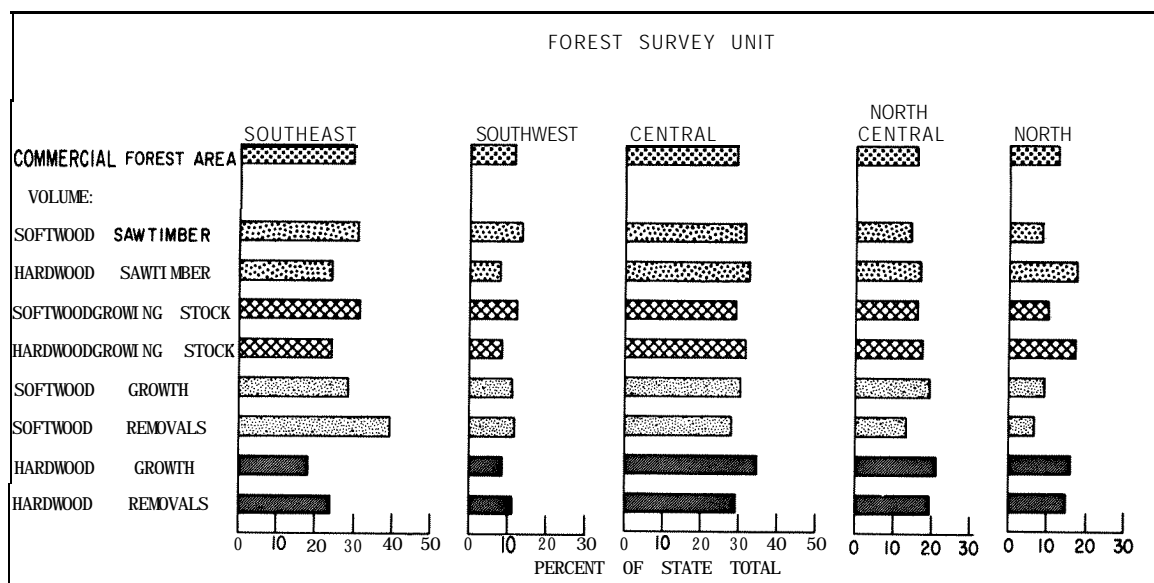


Figure 3. — Relative importance of forest resource by Survey Unit, Georgia, 1972.

5.0 inches d.b.h. during the year, accounted for another 19 percent. Growth on ingrowth, growth on removals before cutting, and growth on mortality before death made up the remaining 3 percent.

In 1971, mortality of growing stock totaled almost 1.56 million cubic feet and reduced gross growth by 9 percent. Suppression, weather, and disease were the leading identifiable causes of death across the State.

Table II. — Annual components of change in the volume of growing stock on commercial forest land.
by Survey Unit and by softwood and hardwood, Georgia, 1971

Survey Unit and species group	Gross growth	Components of growth					Mortality	Net growth	Removals	Net change
		Survivor growth	Ingrowth	Growth on ingrowth	Growth on removals	Growth on mortality				
----- Million cubic feet -----										
Southwest:										
Softwood	355.0	281.6	59.0	5.1	8.7	0.6	20.2	334. x	311.4	+23.4
Hardwood	94.1	77.5	14.9	0.7	0.8	0.2	14.6	79.5	57.0	+22.5
Total	449.1	359.1	73.9	5.8	9.5	0.8	34.8	414.3	368.4	+45.9
Southwest:										
Softwood	143.4	114.4	23.9	2.1	2.7	0.3	10.6	132.8	91.9	+40.9
Hardwood	46.6	37.0	8.2	0.5	0.7	0.2	9.0	37.6	26.6	+11.0
Total	190.0	151.4	32.1	2.6	3.4	0.5	19.6	170.4	118.5	+51.9
Central:										
Softwood	390.0	293.8	61.3	2.0	6.9	1.0	28.8	351.8	220.9	+130.9
Hardwood	154.5	125.3	29.2	0.5	0.5	0.5	25.4	148.5	68.9	+79.6
Total	544.5	419.1	90.5	2.5	7.4	1.5	54.2	500.3	289.8	+210.5
North Central:										
Softwood	200.3	185.4	50.7	5.9	8.93	0.6	18.4	226.5	105.9	+120.6
Hardwood	144.9	115.4	29.5	0.3	0.3	0.3	10.0	90.3	46.4	+43.9
Total	345.2	256.2	76.5	7.4	4.2	0.9	28.4	316.8	152.3	+164.5
North:										
Softwood	188.6	85.0	23.9	1.8	0.6	0.2	6.2	107.2	53.7	+53.5
Hardwood	106.4	67.1	39.8	0.6	0.6	0.6	12.4	68.2	35.1	+33.1
Total	194.0	152.1	36.7	2.8	2.0	0.4	18.6	175.4	88.8	+86.6
State:										
Softwood	1,237.3	980.1	234.9	25.7	23.0	2.7	84.2	1,153.1	783.8	+369.3
Hardwood	495.6	389.1	106.5	1.1	1.4	1.4	74.4	424.1	234.0	+190.1
Total	1,732.8	1,355.1	341.8	27.7	27.1	4.1	158.6	1,577.2	1,017.8	+559.4

Insect losses ranked fourth and were largely attributed to pine bark beetle infestations. Losses to wildfire ranked fifth and were down substantially when compared with losses in previous surveys. The number of wildfires each year has remained high, but because of the excellent fire control program in the State, individual burns have generally been confined to small areas (table III). Finally, this latest Survey measured a significant volume of hardwood mortality caused by beaver activity along many of the streams. These losses occurred mostly in the southeastern and central sections of the State. More

than half of the total mortality was southern **yellow** pine, which is plagued with two of the forest's worst enemies-fusiform rust and bark beetles.

Overall, there has been a decline in the growth loss attributed to mortality, and this explains part of the increase in the rate of net growth. For example, the 1961 survey indicated that mortality losses were reducing gross growth by 15 percent annually. The g-percent reduction determined for 1971, therefore, indicates a marked improvement.

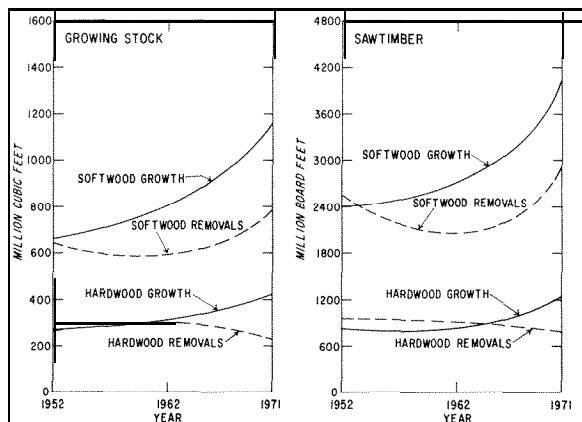


Figure 4. — Trend in net growth and timber removals in Georgia since 1952.

Table III. — Forest area under fire protection, protected area burned, number of fires, and average size of fires, Georgia, 1961-1971"

Year	Forest area protected		Protected area burned		Fires	Average size of fires
	Thousand acres	Percent	Thousand acres	Percent		
1961	22,930	98.55	67	0.29	8,900	8
1962	22,931	98.55	56	0.25	8,654	6
1963	24,528	98.43	63	0.25	10,577	6
1964	24,842	98.45	30	0.12	6,474	5
1965	25,083	99.22	31	0.12	6,895	4
1966	25,110	99.50	65	0.26	8,222	8
1967	25,240	100.00	51	0.20	9,804	5
1968	25,284	100.00	90	0.35		8
1969	25,304	100.00	47	0.19	13,702	5
1970	32,278	100.00	60	0.19		4
1971	28,785	100.00	43	0.15	10,635	4

'Source: U. S. Department of Agriculture, Forest Service, Forest Fire Statistics, 1961-1971.



Timber Products Output

1971 TIMBER HARVEST VALUED AT \$122 MILLION

The volume of roundwood timber products harvested from Georgia's forests in 1971 totaled 813 million cubic feet. The stumpage value of the timber which provided these products was estimated at \$122 million. A canvass of the primary wood-using industries conducted by the Georgia Forestry Commission showed that more than 3.50 mills operated in the State during 1971 (fig. 5). These mills received logs, bolts, and other forms of roundwood from which they manufactured lumber, veneer, plywood, pulp, paper, and other products. In addition, an undetermined number of secondary manufacturing plants located in the State were involved in the remanufacture of lumber, plywood, paper, and other products into finished goods such as furniture, fixtures, and containers. Altogether, the timber-based industries employed some 53,000 people and generated an annual payroll exceeding \$3 15 million. These figures are presented to provide some measure of the economic importance of timber in the State.

PULPWOOD IS THE LEADING TIMBER PRODUCT

In terms of volume, pulpwood is the leading timber product harvested from Georgia's forests and accounted for 5.5 percent of the total roundwood product output in 1971. In fact, the State leads the Nation in pulpwood production.

In addition to the 44.5 million cubic feet of roundwood output, sawmills and other wood-using plants provided the pulpmills with almost 97 million cubic feet of wood fiber in the form of plant byproducts. These byproducts are credited to improved timber utilization and did not involve additional cut of standing timber. With the current rate of expansion in the lumber and plywood industries, it is conceivable that the pulpmills will be obtaining an even greater share of

their wood requirements from byproducts. In recent years, a substantial number of chip-n-saw mills have been established.

The pulp industry, dependent primarily upon wood fiber, is able to utilize most species and a wide range of tree sizes and quality classes. Nevertheless, the industry's current procurement system reflects a strong preference for softwood, and is often in competition with the lumber industry for the sawtimber-quality trees. For example, 89 percent of the round pulpwood produced in 1971 was softwood, and included almost 1 billion board feet of sawtimber, based upon Forest Survey's merchantability standards. This finding suggests a further opportunity for alleviating some of the pressure on the supply of softwood sawtimber. For example, more integrated product processing could channel more of larger trees into meeting the lumber and plywood demands.

Since 1961, pulpwood production has increased by almost 50 percent; however, production has leveled off in the past two years (fig. 6). Some soft spots have developed in the pulp markets, and the rate at which new capacity was being added has slowed markedly. The pulp industry has expended larger sums of money on modernization and on air and water pollution abatement, which undoubtedly has affected the allocation of available capital. As long as population and economic activity continue to grow, however, the demand for pulp and paper products will likely be strong. Ultimate scarcities and rising prices of raw materials such as petroleum, together with environmental factors relating to manufacturing pollution and problems of disposal of nonbiodegradable products, will tend to limit inroads of competitive materials into the pulp, paper, and board markets.

In 1971, pulpmills with a combined capacity of 13,888 tons per day operated at 1.5 locations in Georgia.

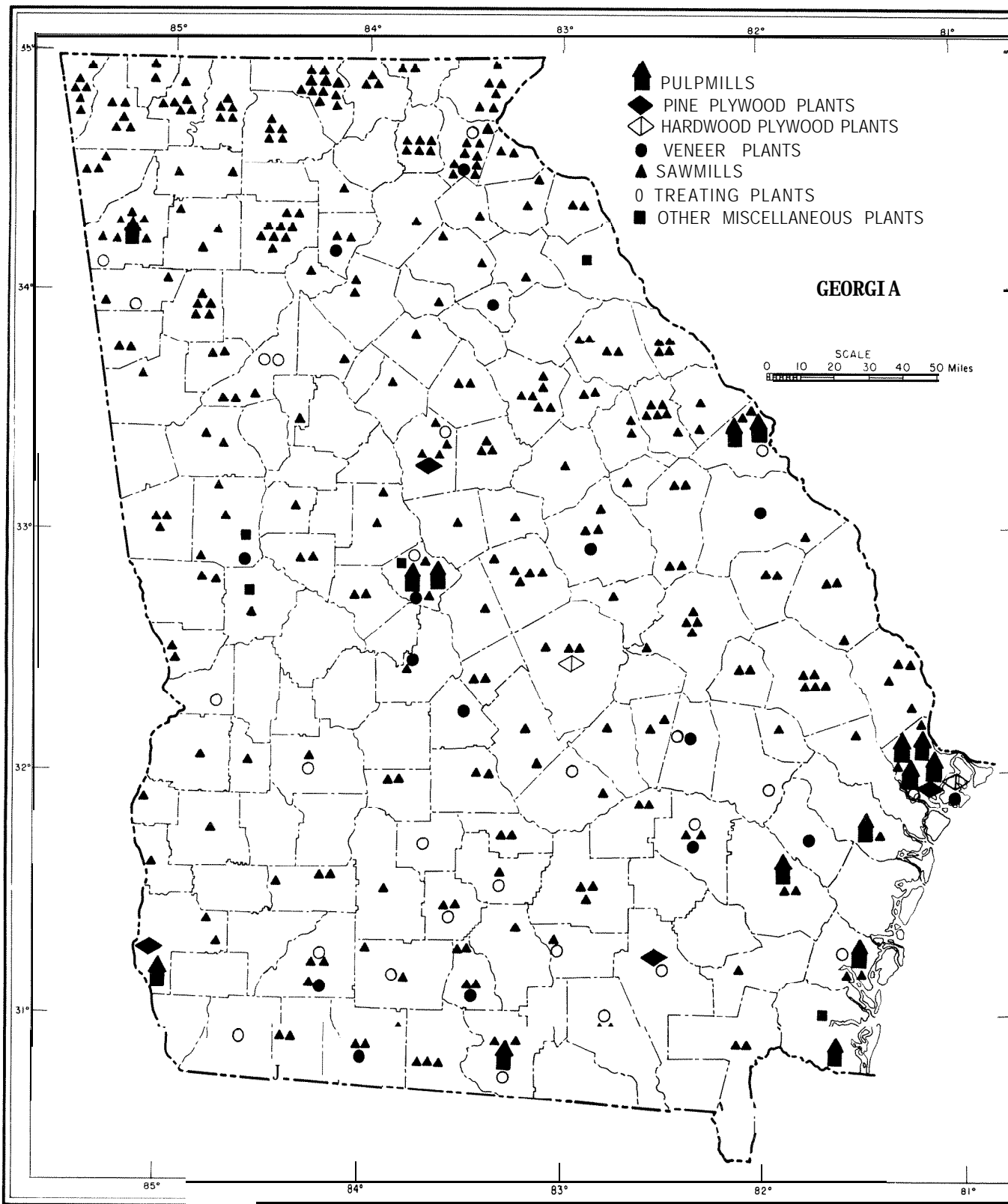


Figure 5. — Location of primary wood-using industries in Georgia, 1971.

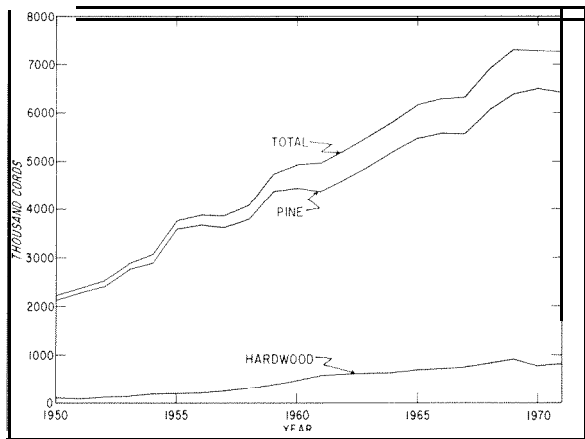


Figure 6. — Pulpwood production in Georgia, including byproducts, 1950 to 1971.

In addition, 23 pulpmills located outside the State drew wood from Georgia's forests. Based on the southern pulpwood production study, 7.5 percent of the 1971 production was processed at mills within the State. The remaining 25 percent was shipped to mills outside the State. In the total interstate flow of pulpwood, imports exceeded exports by about 8 percent.

SOFTWOOD SAW-LOG OUTPUT UP

Saw logs are the second leading timber product and accounted for 36 percent of the total roundwood output in 1971. Although annual estimates of saw-log output are not available, lumber production figures reflect the trends sufficiently for this analysis (fig. 7).

Over the years, the lumber industry in Georgia has experienced several traumatic fluctuations in the demand for its products. In recent decades, the strongest

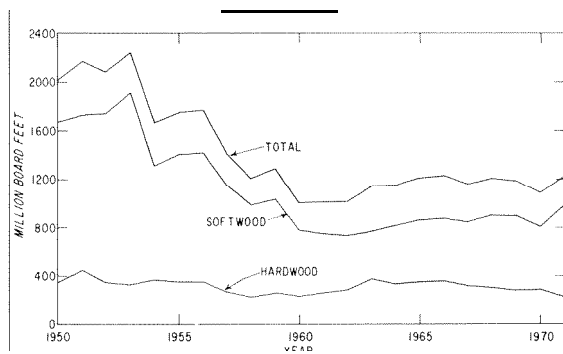


Figure 7. — Lumber production in Georgia, 1950 to 1971.
Sources: Bureau of the Census and 1971 industry canvass.

demands developed during the early forties and again in the early fifties. War economies, of course, stimulated both of these booms. During each of these periods, production rose to levels near or exceeding 2 billion board feet annually. Short and modest lumber recessions occurred in between. The big decline, however, started in 1953 and extended to 1960. Over this 7-year period, annual lumber production dropped off by 55 percent and reached a low of 1,007 million board feet. Changes in types of construction and strong competition from West Coast species were two of the major factors which contributed to the decline. Literally hundreds of small, inefficient sawmills, many of them the portable type, closed down and vanished from the scene during this period. For the first time, pulpwood surpassed saw logs and became the State's leading timber product. During the sixties, the lumber industry experienced some firming in its markets, and there was a modest upward trend in production.

Then, beginning in 1970, a boom in new home building of unprecedented proportion started to sweep the Nation. Within a 2-year period, the number of housing starts soared from an annual rate of less than 1.5 million to an all-time record of almost 2.4 million starts in 1972. At the time this report is being written, the housing boom is continuing with little abatement, and the demand for softwood lumber is threatening to overtake supplies. Sawmills in Georgia and elsewhere are operating at near full capacity, and new mills are under construction or on the drawing boards.

Timing of the fourth Forest Survey in Georgia has been such that only the beginning of the upsurge in softwood saw-log output shows up in the statistics. The 1971 estimate of more than 1.2 billion board feet is about 21 percent greater than the 1961 figure. All indications are, however, that the 1972 output was substantially higher.

Softwoods, primarily southern yellow pine, provided about 80 percent of the 1971 output; however, slightly over 300 million board feet of hardwood saw logs was harvested. The year 1971 might best be described as rather sluggish for the hardwood lumber market but, here again, the tempo has picked up on the heels of the Forest Survey. The furniture market is a major factor in the demand for hardwood lumber, and this market lags slightly behind that for housing.

About 300 sawmills operated in Georgia in 1971, and these mills received over 95 percent of the State's saw-log harvest. Industry canvasses indicate that the

interstate flow of saw logs was small but that Georgia imported 75 percent more than was shipped outside the State.

OUTPUT OF VENEER LOGS DOUBLES

Veneer logs are now the third leading timber product in terms of volume, and accounted for 5 percent of the total roundwood output in 1971. Production totaled 40 million cubic feet compared to only 18 million cubic feet in 1961. All of this increase is attributed to the introduction and development of a new industry in Georgia-pine plywood.

The first major pine plywood operation in Georgia was started at Savannah in 1966. By 1971, plants had been added at Cedar Springs, Waycross, and Monticello. Pine plywood production in Georgia has now climbed to more than 500 million square feet, 3/8-inch basis, annually. As in the case of softwood lumber, the surge in new home building has created a strong demand for plywood. If such a strong demand continues, further expansion of the pine plywood industry in Georgia can be expected.

In contrast to the rapid increase in the output of softwood veneer logs, the output of hardwood has declined. The annual harvest of hardwood veneer logs has dropped by about one-fourth since the early sixties. An estimated 186 million square feet, as reported, of hardwood plywood was produced in Georgia in 1972. The hardwood veneer and plywood industries face strong competition from foreign imports. The continuing displacement of wooden containers by fiber, plastic, and other substitutes has also been a factor in the hardwood veneer market.

OUTPUT OF OTHER ROUNDWOOD PRODUCTS

Other timber products harvested in 1971 included fuelwood, poles, piling, posts, cooperage, and excelsior bolts. Collectively, the volume of all these products totaled an estimated 31 million cubic feet. When compared with the 1961 estimates, one of the largest increases was in the production of fenceposts, up from 3 to 10 million posts. Use of fuelwood has continued to decline; however, substantial markets have developed in some of the larger urban areas for fireplace wood. Almost three-fourths of all these miscellaneous products were cut from softwood species.

PLANT BYPRODUCTS ESTIMATED AT 119 MILLION CUBIC FEET

Primary wood-using plants in Georgia generated an estimated 169 million cubic feet of wood residues in 1971, excluding bark. Approximately 119 million cubic feet, or 70 percent, of these residues was converted into byproducts, such as pulp chips, particleboard, litter, and domestic fuelwood. The figure also includes a small amount of lumber produced from veneer cores. In North Georgia there is a very substantial demand for shavings and sawdust for litter associated with poultry production in the area. The byproduct figure excludes another 9 million cubic feet of wood residues used for industrial fuel. Approximately 41 million cubic feet of the wood residues generated were not used. Most of this unused material was in the form of sawdust and shavings.

ABOUT HALF OF THE BARK RESIDUE USED

In addition to the wood residues generated, more than 2.6 million tons of bark residue were generated in 1971. About half of this bark was used for industrial fuel with relatively small quantities used for mulch and fiber products. An estimated 48 percent of the bark residue was either burned as waste or left in the woods, piled or dumped. More than 80 percent of the bark residue generated in Georgia is from softwood species, primarily southern yellow pines. Although there is growing interest in the development of uses of bark, its value as an industrial fuel will likely be enhanced by the shortages and higher prices of conventional energy sources.

ALMOST ONE-FOURTH OF REMOVALS NOT USED FOR PRODUCTS

Of the 8 13 million cubic feet of roundwood products harvested from Georgia's forests during 1971, more than 765 million cubic feet, or 94 percent, came from growing-stock trees 5.0 inches d.b.h. and larger cut from commercial forest land. An additional 252 million cubic feet of growing stock was removed from the inventory but was not used for products. The removals of all growing stock, therefore, totaled 1,018 million cubic feet. This means that almost 25 percent of the merchantable volume removed from the inventory was either left in the woods as logging residue or was removed by land clearing, urban development, and other land-use changes where the timber was not used.

Logging residues totaled 118 million cubic feet and included the unused, merchantable portions of trees cut or destroyed in the process of harvesting timber. As might be expected, the level of utilization was somewhat better in the harvesting of softwood products than in the harvesting of hardwood products. For example, 84 percent of the total product harvest from growing-stock trees came from softwood species, but less than 62 percent of the logging residue was softwood.

Other removals totaled 134 million cubic feet and included growing-stock trees cut or destroyed in land clearing or development activities; girdled, poisoned, or removed in cultural activities; as well as trees left standing but removed from the commercial forest base. Here again, the proportionate toll was somewhat greater for hardwood than for softwood. For example, hardwoods comprise less than 42 percent of the growing-stock inventory, but 51 percent of these other removals was hardwood.



Timber Supply Outlook

With a 29-percent increase in inventory volume between 1961 and 1972 and annual growth exceeding removals by 55 percent, the timber supply outlook is relatively bright in Georgia when compared with that in many other parts of the country. The State, other public agencies, forest industries, and other private land-owners have invested substantial sums of money and energies in tree planting, better forest protection, improved timber culture and utilization, and other forestry endeavors to bring this situation about. The task of maintaining an ample supply of timber to meet demands is a continuous job, however, requiring long-range planning that involves a host of factors. Deficiencies persist within the favorable overall supply picture and are evidenced by the present concern and debate over timber supplies, demands, and prices. Statistics showing a build-up in timber inventory probably provide little consolation to the consumers of forest products who have experienced the shortages and price instability of recent months.

This appraisal of the timber supply outlook focuses on the amount of timber prospectively available from Georgia's forests over the next three decades based on specified assumptions. Timber is a renewable and expandable resource.

Over time, the supply can be increased within the limitations established by the growth capacities of those lands available for production. Response to timber production efforts, however, is slow relative to other crops. For example, the prospectively available supply of timber for the next decade or longer is fairly well determined by actions already taken.

With more than 90 percent of Georgia's timberland in private ownerships, the amount of timber harvested each year is largely determined by the unregulated forces of supply and demand. Only a small part of the annual harvest comes from publicly owned forests where the allowable cut is regulated through policy. Nevertheless, the basic concept of sustained yield, accepted and prac-

ticed in sound forest management, suggests that the net annual growth should establish allowable cut over the long run. Any prolonged breach of this concept will ultimately reduce timber supplies. Current and prospective growth, therefore, can serve as a guide for wood procurement activities.

In 1971, net annual growth totaled 1,577 million cubic feet and included 5,243 million board feet of sawtimber. For the same year, removals totaled 1,018 million cubic feet and included 3,706 million board feet of sawtimber. With the recent upsurge in the demand for softwood lumber and plywood and the prospective increases anticipated in the demands for other timber products, the question arises as to the extent that annual cut could be raised and sustained over time. Two separate projections were made in an attempt to answer this question.

PROSPECTIVELY, CUT CAN INCREASE BY 70 PERCENT

The first projection was for 30 years and was intended to establish a realistic measure of available cut based on a continuation of recent trends in forest area and the current level of timber cultural activity. The results of this projection are shown in table 28 and indicate a prospective available cut of 1,733 million cubic feet annually by year 2001. This is 70 percent greater than the volume of removals determined for 1971. The projection also allows for a further buildup in the inventory from 25.3 to 32.5 billion cubic feet. The prospective available cut of sawtimber increases from 3,706 to 6,370 million board feet over the same period.

Several basic assumptions were involved in this projection. The primary control was an assumption that the current margin between growth and removals will gradually diminish until growth and removals are in balance by year 2001. Area of commercial forest land was assumed to continue to decline at the rate of 50,000 acres each year. This is very near the average rate of real change which occurred between 1961 and 1972.

The 1971 growth rates were gradually reduced by 10 percent in anticipation of overstocked conditions developing in many of the unmanaged stands, and to compensate somewhat for the fact that the 1972 survey reflects a rate of ingrowth not likely to be sustained. The 1971 mortality rates were applied throughout the projection.

Separate projections were made for softwoods and hardwoods (fig. 8). Under the assumptions used, the results indicate that softwoods will provide two-thirds of the prospective increase in available cut of total growing stock and 80 percent of the prospective increase in available sawtimber. Considerably more effort has gone into the regeneration and management of pine than has gone into hardwood management.

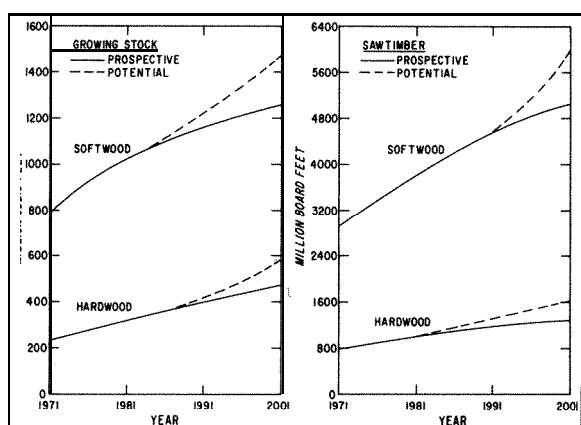


Figure 8. — Prospective and potential available cut Georgia, 1971-2001.

POTENTIAL AVAILABLE CUT IS DOUBLE THE 1971 LEVEL

The second projection was also for 30 years and was intended to establish a realistic measure of the maximum level of available cut which might be reached and sustained through accelerated timber management. Results from this projection indicate a potential available cut of 2,045 million cubic feet by year 2001, or about double the amount of removals in 1971. In this projection, the potential available cut of sawtimber climbed to 7,586 million board feet (fig. 8).

These estimates of potential available cut reflect the inherent capacity of those forest lands expected to be available for timber production when fully stocked. The same assumption was made with regard to the decline in commercial forest area as was made in the prospective projection. Management goals were expressed in terms

of basal area per acre and a stand-structure quotient for both softwoods and hardwoods. The goals selected for projection control would allow average stand densities of trees 5.0 inches d.b.h. and larger to increase to 85 square feet per acre, and inventory volume to increase to 1,480 cubic feet per acre. The stand-structure quotient is the quotient of the number of trees in any 2-inch diameter class divided by the number in the next larger class. This value is useful in describing the diameter distributions of trees within the stand. The quotients developed for Georgia's potential stand were 1.7 for softwoods and 1.8 for hardwoods, both of which call for more trees in the larger diameter classes. Finally, it was assumed that 1971 mortality rates could gradually be reduced by one-half over the next 30 years through improved protection and management.

Opportunities do exist for expanding the inherent growth capacity described for Georgia's forest lands. Some of the more promising opportunities center around site improvement, forest fertilization, and the further development of genetically superior trees. Some progress has already been made in each of these areas; however, no estimate of the potential gains which might develop from these activities is included in this analysis.

MORE CUT TO COME FROM PLANTATIONS

Over the 30-year period covered by this projection, an increasing share of the cut will come from the thinning and harvesting of pine plantations. Conceivably, a third or more of the pine cut in Georgia could be coming from plantations by 1985. About 3 million acres had been planted or artificially seeded in the State as of June 30, 1971, according to reports published by the Forest Service, USDA (table IV). During the late fifties, almost 700,000 acres were planted in Georgia under the Conservation Reserve Soil-Bank Program. Although the rate of tree planting dropped off sharply after the expiration of this program, planting has continued at an average annual rate of 110,000 acres. Since the end of the Soil-Bank Program, about two-thirds of the tree planting has occurred on lands owned by forest industry, mainly pulp and paper firms.

Slash pine and loblolly pine have been the preferred species for planting, and in terms of acres planted, the proportions have been about 3 to 1 in favor of slash pine. In fact, the Survey found that about two out of every five slash pine trees 1.0 inch d.b.h. and larger in the inventory have been planted.

Table Iv. — Acres of forest planting,¹ by ownership class, Georgia, 1961-1971

Fiscal year	Ownership class				1 1 owner- ships	Accumu- lative total
	National Forest	Other public	Forest industry	Other private		
..... Acres						² 1,698,911
1961	3, 990	2, 382	96, 568	100, 527	203, 467	1,902,378
1962	5, 411	1, 638	20, 649	41, 998	69, 696	1,972,074
1963	4, 476	2, 761	18, 411	43, 340	129,054	2,101,128
1964	3, 202	2, 443	74,691	34, 192	114, 534	2,215,662
1965	2, 932	3, 703	70, 085	29, 888	106, 608	2,322,270
1966	2, 011	4, 614	78, 628	29, 147	114,460	2,436,730
1967	1, 595	2, 709	86, 647	44, 298	135, 249	2,571,979
1968	2, 288	4, 236	88, 567	31, 247	126, 338	2,698,317
1969	1, 785	4, 113	73, 622	26, 539	106, 119	2,804,436
1970	2, 302	4, 123	63, 344	16, 129	85, 898	2,890,334
1971	3, 228	4, 412	73, 757	21, 420	102, 817	2,993,151

¹Includes acres of planting by direct seeding. Source: U. S. Department of Agriculture, Forest Service, *Forest and Wind-barrier Planting and Seeding in the United States*.

*Accumulative total prior to FY 1961.

Some of the advantages of plantation management over natural stands are obvious and certainly outweigh the few subtle shortcomings associated with man-made forests. Plantations enable the land manager to exercise greater control over species composition and spacing and promise greater yields over shorter periods of time. The trees are more uniform in size and merchantable length, which can be a real advantage at time of harvest. Plantations also open up the opportunities afforded by genetic improvement, site preparation, and fertilization. Generally, however, the high initial costs of tree plantations dictate the use of short rotations. As a result, most of the pine plantations in Georgia will probably be harvested within 30 years of their establishment. As greater reliance is placed on these plantations as a source for timber, the wood industries will be manufacturing their products from a somewhat different kind of tree than they have been accustomed to using. The average tree will probably be younger and faster grown.

MOST PLANTATIONS ESTABLISHED IN SOUTHERN GEORGIA

The origin of each stand was recorded for each forest sample location to provide another estimate of number of acres planted, as well as information on the distribution of the plantations (table V). These classifications indicated that tree planting or seeding has occurred on about 3.2 million acres, which is reasonably consistent with the estimates in table IV, compiled from estimates of numbers of trees shipped from the nurseries. The findings also show that more than 62 percent of the plantations have been established in the two coastal Survey Units.

Whether the planting occurred prior to or since the previous Forest Survey was also determined. Here, the findings show that almost 2 million acres, or 61 percent, of the planting occurred since 1960. A substantial number of the older plantations are in the piedmont sections and were planted under the Conservation Reserve Soil-Bank Program.

QUALITY OF TIMBER LIMITS UTILIZATION

It is important in this analysis of the timber supply outlook that some assessment be made of the quality of the current and prospective timber supplies. In the past, many practices and factors contributed to a rather general deterioration in timber quality. Harvesting practices commonly resulted in repeated high grading of stands, and boundary sales to some specified minimum tree size provided little control over the residual conditions. In reality, the harvesting practice was often a detriment to, rather than a part of, the regeneration process. Rough and rotten trees and certain species were left in quantities which seriously impeded regeneration. Such residual conditions also fostered wildlife, disease, insects, and other damaging agents.

Improper harvesting practices still persist but to a lesser extent. More of the forest lands have been brought under sound management, protection and utilization have been improved, and professional silvicultural advice is readily available to most forest owners when they are ready to harvest and regenerate their stands. Further progress in each of these areas will lead to substantial improvement in the overall quality of timber available for the wide range of products produced from the forests.

The quality of the current inventory still reflects much of this past mismanagement, and one of the most pressing tasks confronting forestry today is that of correcting the conditions created by past mistakes. Small size and inferior quality limit utilization and reduce the supply of timber usable for saw logs, veneer logs, poles, and piling. A relatively small portion of the 1972 timber inventory in Georgia meets the size and quality requirements for these valuable products. First of all, of the 28.0 billion cubic feet in all live trees 5.0 inches d.b.h. and larger, almost 2.7 billion cubic feet, or 9 percent, is in trees which do not qualify as growing stock because of species, roughness, poor form, or internal rot. Another 9.5 billion cubic feet, or 34 percent, is in trees not yet large enough for sawtimber. When another 6 percent is deducted for volume in the upper-stem portion of sawtimber trees, only 14.1 billion cubic feet, or about half of the original total remains. Of this amount, only 5.6 billion cubic feet are in pine

Table V. — Area of commercial forest land, by stand origin and Survey Unit. Georgia, 1972

Stand origin	State	Survey Unit											
		Southeast			Southwest			Central			North		
		<i>M</i>	<i>acres</i>	<i>Percent</i>	<i>M</i>	<i>acres</i>	<i>Percent</i>	<i>M</i>	<i>acres</i>	<i>Percent</i>	<i>M</i>	<i>acres</i>	<i>Percent</i>
Natural stands with no evidence of artificial regeneration	21	590.6	86.9	5,826.8	18.3	2,477.2	85.9	6,453.5	88.1	3,741.7	93.6	3,091.4	96.8
Stands originating wholly or in part from artificial regeneration since 1960		1,974.7	8.0	1,111.8	14.9	251.3	8.7	416.3	5.1	125.0	3.1	70.3	2.2
Stands originating wholly or in part from artificial regeneration prior to 1960		1,273.7	5.1	502.0	6.8	156.3	5.4	452.1	6.2	132.5	3.3	30.8	1.0
All stands		24,839.0	100 ⁰	7,440.6	100.0	2,884.8	100.0	7,321.9	100.0	3,999.2	100.0	3,192.5	100.0

trees of grade I and 2 quality, or in other species that contain grade 1 and 2 logs.

SEVERAL FACTORS LIMIT TIMBER AVAILABILITY

How much of the timber inventory that is available to prospective buyers at a particular point in time is a critical question. Undoubtedly, at some price level forest industries could purchase more timber than it would be wise to cut or the resource could sustain. The objective, however, is to achieve and maintain a balance between timber supplies and demand which will yield a flow of products at reasonable prices that the consumers can afford.

Over the long run, it is probably reasonable to assume that all timber produced on commercial forest land will eventually be harvested. At any time, however, an undetermined quantity of the inventory is not available for several reasons. Many stands and forest conditions do not offer any logging chance because of low volume per acre, small size, inferior quality, poor accessibility, captive holdings, or the owners' unwillingness to sell.

For example, the Forest Survey statistics for Georgia indicate that volume per acre on 11.2 million acres averaged less than 1,500 board feet in 1972. Another 4.5 million acres, with 1,500 board feet or more per acre, are located in deep swamps, bays, along stream margins, and in rugged mountainous terrain where accessibility and logging conditions are seasonal or difficult. Still another 1.2 million acres are owned by forest industry, and their timber would normally not be available to competing industry moving into the State. Finally, in the absence of any information on the number of acres held by private, nonindustrial owners who are unwilling to sell, one might assume that the Forest Survey estimate of 0.8 million acres in mature pine and oak-pine stands provides a crude measure. This deductive process, therefore, suggests that only 7.1 million acres, or less than 30 percent of the commercial forest land, offered an unencumbered logging chance to new lumber and plywood industry as of 1972. If the same deductive process is used with a minimum volume of 500 cubic feet per acre, the results indicate that 9.6 million acres, or almost 40 percent of the commercial forest, offered an unencumbered logging chance to new pulp or fiber industry.



Management Opportunities

In recent years more and more attention has been focused on studies of opportunities for increasing future timber supplies. As the demand for timber products continues to increase in the face of a diminishing forest base, efforts to augment future timber supplies will need to be concentrated in those areas and on those opportunities which promise the greatest return from the limited funds and resources available. As the Georgia statistics clearly indicate, some further gains are possible through improved protection and closer utilization of the existing supplies. Over the long run, however, the greatest opportunities appear to be in the area of acceleration and intensification of timber cultural practices. As discussed in the previous chapter, the growth potential of Georgia's forests is at least 30 percent greater than that achieved up to now, excluding possible gains from site improvement, fertilization, and the further development of genetically superior trees.

RECENT TRENDS IN FORESTRY ACTIVITIES

Before goals or program objectives can be formulated for accelerating and intensifying timber cultural practices, information is needed which will describe and quantify what is already being done. After all, the existing forest conditions were created largely by past forestry practices and natural disturbances. In conjunction with the Georgia survey, a classification was recorded at each sample location identifying the primary treatment or disturbance which had occurred during the 11-year remeasurement period. A summary of this treatment and disturbance information by broad management and ownership classes provides insight of recent trends in forestry activities (table VI).

About half of the 24.8 million acres classified as commercial forest land were treated or disturbed between 1961 and 1972. More than 4.4 million acres were harvested, and thinning or other intermediate cutting occurred on another 4.6 million acres. When the acres of land clearing and other forest diversions are added, the figures indicate that approximately 1 million acres

were cut into annually over the period. An estimated 2.4 million acres which were harvested had been regenerated, along with another 0.8 million acres where harvesting was not involved. In addition to the stands which experienced some form of cutting or were artificially regenerated, 2.8 million acres experienced other kinds of treatment or disturbance. These other treatments included prescribed burning, grazing, turpentining, draining, and site preparation. The natural disturbances recognized included wildfire, insect infestations, disease and animal damage, and wind and ice storms. The relatively large percentage of the pine plantations in the natural disturbance category is attributed to their apparently high susceptibility to fusiform rust.

HALF OF THE STANDS WERE UNDISTURBED

Some 12.2 million acres, or almost half of the land classified as commercial forest, did not show any evidence of treatment or major disturbance over the 11-year remeasurement period. Significant differences were observed, however, in the occurrence of treatment or disturbance among the broad management and ownership classes and, therefore, among the different parts of the State. For example, only about 41 percent of the stands occupied with pine forest types in 1972 had gone untreated or undisturbed, compared to 58 percent for the stands occupied with hardwood types. An estimated 62 percent of the bottomland hardwood stands was untreated or undisturbed. By broad ownership class, the highest rate of treatment and disturbance was observed on forest industry lands and the lowest rate on public lands. By Forest Survey Unit, the highest rate of treatment and disturbance was found in Southeast Georgia and the lowest rate in North Georgia.

ONE-THIRD OF STANDS IN GOOD CONDITION

Another classification was recorded at each sample location to break the commercial forest into condition

Table VI. — Area of commercial forest land, by broad management, ownership, and past treatment or disturbance classes, Georgia, 1972

Broad management and ownership classes ^a	Total area	Primary treatment or disturbance between 1961 and 1972							
		Harvesting with artificial regeneration	Harvesting with natural regeneration	Other harvesting	Intermediate cutting	Artificial planting	Other treatment ^b	Natural disturbance	None
<i>Thousand acres</i>									
Nonstocked forest:									
Public	33.4	—	—	7.8	—	—	1.8	3.2	20.6
Forest industry	163.5	—	—	109.3	3.9	—	20.5	10.7	19.1
Other private	461.9	—	—	130.2	32.7	—	32.1	24.7	241.2
Total	658.8	—	—	247.3	36.6	—	55.0	38.6	280.9
Pine plantations:									
Public	50.4	21.1	—	—	7.3	1.8	0.9	7.2	1.1
Forestry industry	1,660.7	745.7	—	—	58.2	362.0	70.7	120.9	30.2
Other private	1,511.2	206.0	—	—	200.2	402.4	67.9	251.0	38.2
Total	3,222.3	972.8	—	—	265.7	766.2	139.5	379.1	69.5
Natural pine stands:									
Public	600.6	—	31.4	7.5	189.2	—	36.6	26.4	305.9
Forestry industry	1,625.4	—	140.3	66.5	387.4	—	197.0	96.6	73.1
Other private	7,149.4	—	560.5	297.7	1,907.5	—	710.1	258.8	3,414.4
Total	9,375.4	—	732.2	371.7	2,484.1	—	943.7	381.8	4,493.4
Oak-pine stands:									
Public	252.6	—	26.0	12.6	66.5	—	1.4	5.5	14.6
Forest industry	571.6	—	56.6	60.0	63.8	—	17.1	10.6	36.2
Other private	3,025.5	—	212.6	355.3	588.5	—	145.6	89.2	1,634.4
Total	3,849.7	—	295.2	427.9	718.8	—	164.1	105.3	2,131.2
Upland hardwood stands:									
Public	552.7	—	10.4	25.2	43.3	—	21.5	10.8	44.4
Forestry industry	567.5	—	49.9	78.5	66.7	—	34.5	11.8	32.1
Other private	3,532.1	—	202.5	444.4	630.8	—	106.7	114.5	1,944.2
Total	4,652.3	—	262.8	548.1	740.8	—	242.7	137.1	2,718.7
Bottomland hardwood stand:									
Public	81.8	—	13.6	10.1	6.7	—	—	8.4	4.1
Forest industry	678.2	—	28.1	71.2	74.7	—	8.1	17.2	47.1
Other private	2,320.5	—	126.3	335.9	262.2	—	79.6	130.0	1,381.1
Total	3,080.5	—	168.0	417.2	343.6	—	87.7	155.6	1,902.3
All classes:									
Public	1,571.5	21.1	81.4	63.2	313.0	1.8	62.2	61.5	96.9
Forest industry	5,266.9	745.1	274.9	385.5	654.7	362.0	347.9	267.7	2,222.3
Other private	18,000.6	206.0	1,102.9	1,560.5	3,629.9	402.4	1,222.2	868.2	9,001.7
Total	24,839.0	972.2	1,459.2	2,009.2	4,597.6	766.2	1,632.3	1,197.4	12,204.9

^aForest industry includes lands under long-term lease.

^bIncludes prescribed burning, grazing, turpentine, draining, and site preparation.

classes. A summary of this information, again by broad management and ownership classes, provides a measure of some of the various treatment opportunities in terms of relative number of acres (table VII).

Based on this classification, one out of every three acres of commercial forest in Georgia appeared to be occupied by immature stands, adequately stocked with trees of desirable quality, relatively free from competition, and located on manageable sites. In other words, conditions found on 8.5 million acres seemed favorable for the achievement of a sufficient growth rate without any major treatment over the next several years. Although many of these stands were still in the seedling

and sapling stages of development, volume per acre averaged about 800 cubic feet and the rate of net annual growth averaged 7.5 percent. About 72 percent of these stands judged to be in good condition was pine and the remaining 28 percent hardwood. By broad ownership class, 5 percent was public, 27 percent forest industry, and 68 percent other private.

HARVEST OPPORTUNITY ON 2.3 MILLION ACRES

Almost 2.3 million acres were classified as mature stands with a harvest opportunity or merchantable stand damaged to the extent that salvage would be considered

Table VII. — Area of idle cropland and commercial forest land, by broad management, ownership, and treatment opportunity classes, Georgia, 1972

Broad management and ownership classes ¹	Total area	Broad treatment opportunity classes				
		Stands in good condition	Harvest or salvage	Thinning or other stand improvement	Conversion or regeneration	Adverse sites or conditions
..... Thousand acres						
Idle cropland:						
Public	—	—	—	—	—	—
Forest industry	—	—	—	—	—	—
Other private	742.7	—	—	—	742.7	—
Total	142.1	—	—	—	142.1	—
Nonstocked forest:						
Public	33.4	—	—	—	30.2	3.2
Forest industry	163.5	—	—	—	149.4	14.1
Other private	461.9	—	—	—	403.3	58.6
Total	658.8	—	—	—	582.9	15.9
Pine plantations:						
Public	50.4	47.0	—	3.4	—	—
Forest industry	1,660.7	1,268.9	27.6	268.8	83.5	11.9
Other private	1,511.2	774.0	61.2	548.5	113.5	14.0
Total	3,222.3	2,089.9	88.8	820.7	197.0	25.9
Natural pine stands:						
Public	600.6	229.8	162.1	115.5	86.6	6.0
Forest industry	1,625.4	743.1	156.4	490.1	218.0	17.8
Other private	7,149.4	3,100.4	617.2	2,235.3	1,099.9	96.6
Total	9,375.4	4,073.3	936.3	2,840.9	1,404.5	120.4
Oak-pine stands:						
Public	252.6	71.4	53.9	42.5	62.8	22.0
Forest industry	571.6	99.6	61.6	122.7	242.4	45.3
Other private	3,025.5	895.9	212.5	769.3	1,034.0	113.8
Total	3,849.7	1,066.9	328.0	934.5	1,339.2	181.1
Upland hardwood stands:						
Public	552.1	85.4	54.3	167.9	61.3	183.8
Forest industry	567.5	130.3	21.3	153.1	249.7	7.1
Other private	3,532.1	786.2	314.5	829.9	1,451.9	149.6
Total	4,652.3	1,001.9	396.1	1,150.9	1,762.9	340.5
Bottomland hardwood stands:						
Public	81.8	8.3	6.1	17.5	36.1	13.8
Forest industry	678.2	61.8	135.3	175.0	125.6	180.5
Other private	3,370.5	230.4	364.2	626.7	639.7	459.5
Total	3,080.5	300.5	505.6	819.2	801.4	653.8
All classes:						
Public	1,571.5	441.9	277.0	346.8	277.0	228.8
Forest industry	5,266.9	2,303.7	408.2	1,209.7	1,068.6	276.7
Other private	18,743.3	8,532.5	2,254.8	5,009.7	5,485.0	892.1
Total	25,581.7	11,278.1	3,036.0	6,566.2	6,830.6	1,397.6

¹Forest industry includes lands under long-term lease.

Across this entire classification, volume per acre averaged about 2,000 cubic feet, but the rate of net annual growth averaged only 4.1 percent. Mortality was high in these stands and was reducing the gross growth by almost 13 percent. About 45 percent of these stands was pine and 55 percent hardwood. By broad ownership class, 12 percent was public, 18 percent forest industry, and 70 percent other private. Although some of these acres might not be available because of public policy and owner attitude, the statistics suggest that harvesting and prompt regeneration of these stands over the next

several years are the most promising opportunities for increasing future timber supplies.

INTERMEDIATE TREATMENT OPPORTUNITY ON 6.6 MILLION ACRES

Almost 6.6 million acres were classified as immature stands either overstocked or receiving competition to the extent that growth would likely be impaired unless thinning, cleaning, or other stand improvement action is taken. Admittedly, a wide range of conditions is included in this classification and the land managers are

confronted with a number of alternative treatment possibilities. In some of these stands, it might be more desirable to go ahead and convert or regenerate. In other cases, the potential growth response might not justify the cost of additional intermediate investment in timber stand improvement and the decision might be to carry the existing stands on to harvest. In other words, from the biological or silvicultural standpoint, the figure of 6.6 million acres is probably a realistic measure of the intermediate treatment opportunity; however, when the economic aspect is added, this measure might be substantially reduced. Across this entire classification, volume per acre averaged about 1,400 cubic feet, and the rate of net annual growth averaged about 6.4 percent. Some 56 percent of these stands was pine and 44 percent hardwood. By broad ownership class, 5 percent was public, 19 percent forest industry, and 76 percent other private.

MANAGEABLE STAND ABSENT ON 6.1 MILLION ACRES

Some 6.1 million acres of commercial forest land were found to be so poorly stocked that manageable stands did not exist. Many of these areas had been recently cutover without regeneration, and others were dominated by scrub oaks, brush, damaged or poor quality *trees*, and the remnants of former stands. In all instances, it appeared that the existing conditions were unlikely to improve unless actions were taken to convert or regenerate these acres into productive stands. Although volume per acre averaged about 500 cubic feet and the rate of net annual growth averaged 5.8 percent, the conditions on most of these areas ruled out any logging chance. Almost 10 percent of the area in this category was classified as nonstocked, another 26 percent was poorly stocked with pine, and the remaining 64 percent was poorly stocked with hardwoods. By broad ownership class, about 4 percent was public, 18 percent forest industry, and 78 percent other private.

For the purpose of this analysis, another 0.7 million acres of idle cropland were added in table VII. Some of these acres will return to agricultural use and others will be developed for other uses; however, their conversion to forest represents about the only opportunity for expanding the timber base in Georgia. When all of these acres are added to the poorly stocked conditions already described, the conversion and regeneration opportunities exceed 6.8 million acres.

Although the task of treating this many acres and bringing them into full production would require tremendous investments, the potential gains in timber supplies

which could be expected dwarf all the other opportunities available. Costs and prospective returns per acre would vary, depending upon condition, site, and response to treatment: however, it is possible to estimate the overall costs and returns which would be involved. For example, if one assumed that the 6.1 million acres of poorly stocked forest land could be regenerated at an average cost of \$45 per acre and that the 0.7 million acres of idle land could be planted at an average cost of \$20 per acre, the overall costs would total \$289 million. It would be reasonable to assume that the prospective annual growth rates on the forest acres could be increased from 30 to 85 cubic feet per acre, and from zero to 85 cubic feet on the idle lands. By the end of a 30-year rotation, timber supplies from these 6.8 million acres could be increased by 11.9 billion cubic feet. If we assume an average stumpage value of only 15 cents per cubic foot, the added timber supplies would be worth at least \$1,790 million.

With the cost and conservative return estimates used in these examples, the investments made on the poorly stocked forest lands would return about 5.8 percent annually on the average with the compound interest formula. On the idle lands, the investments would promise a 10.3-percent rate of return. Although these prospective rates of return might seem exceedingly low to the speculator, they are probably competitive with the alternative investment opportunities available to the average landowner. Of course, to the extent that consumers are willing to pay higher prices for timber-based products, the forestry investments become more attractive. For example, if we assumed an average stumpage value of 25 cents per cubic foot in light of recent increases in stumpage prices, the prospective rates of return on the investments described jump to 7.7 and 12.2 percent, respectively. Naturally, the more desirable approaches to improving forestry investment opportunities point toward reducing treatment costs, increasing yields per acre, and shortening rotations. This is the reason for the expanding emphasis on tree improvement, forest fertilization, and the development of better forestry equipment and technology through research.

OPPORTUNITIES LIMITED ON 1.4 MILLION ACRES

Finally, the management opportunity classifications applied in the Georgia survey indicated that adverse physical features severely limit the opportunities for intensifying timber cultural practices on at least 1.4 million acres of commercial forest land. Factors taken into consideration in making this determination included

topography and slope, water conditions and trafficability, accessibility, tract size, and site productivity, among others. With these factors classified at each sample location, a relative scale ranging from 1 to 9, from the best to the poorest opportunities, was used as the criteria for this screen. The 1.4 million acres screened out in table VII fell in a zone between 7 and 9 on the scale and, in addition, had received no treatment during the remeasurement period. The logic applied was that the limited funds and resources available for the acceleration and intensification of timber culture would not be expended on these adverse or marginal sites so long as more promising opportunities were available. By broad ownership class, 16 percent of these lands was public, 20 percent forest industry, and 64 percent other private.

Undoubtedly, the figure of 1.4 million acres is a very conservative estimate of the forest area in Georgia which does not lend itself to intensive forestry practices. Although this figure includes most of the deep swamps, bays, mountain tops, and steep slopes, access to another 4 million acres along the stream margins is seasonal, to say the least. Still, these are some of the most productive sites, based upon their inherent capacity to grow timber. Many of the poorer sites do have the advantage of being highly accessible. Each landowner or manager who is willing to invest in intensive forestry practices must develop his own criteria for ranking the opportunities and alternative courses of action available to him. Overall estimates of the various forest conditions and management opportunities as presented in this analysis are provided as guidelines and input for the broader program and policy decisions.



Appendix

SURVEY PROCEDURE

The basic steps of the procedure used in the fourth Forest Survey of Georgia were as follows:

1. **Initial** estimates of forest and nonforest areas were based on the classification of 126,222 sample clusters systematically spaced on the latest aerial photographs available. A **subsample** of 9,443 of these 16-point clusters was checked on the ground, and a linear regression was fitted to the data to develop the relationship between the photo and ground classification of the subsample. This procedure provided a means for adjusting the **initial** estimates of area for change in land use since date of photography and for photo misclassifications.

2. Estimates of **timber** volume and forest classifications were based on measurements recorded at 6,086 ground sample locations systematically distributed within the commercial forest land. A 10-point cluster of plots, measured with a basal area factor of 37.5 square feet per acre, was systematically spaced on an acre at each of these sample locations. Trees less than 5.0 inches d.b.h. were tallied on fixed-radius plots around the point centers.

3. Equations prepared from detailed measurements collected on trees tallied at 281 sample locations were used to compute the volumes of individual tally trees of the major species. Similar measurements taken throughout the Southeast were used to supplement the Georgia data in the computation of volumes of the minor species. A mirror caliper and sectional aluminum poles were used to obtain the additional measurements on standing trees required to construct the volume equations. The same subsample of plots used for the tree-volume study also served as a quality control of field measurements. Felled trees were measured at 99 active cutting operations to provide utilization factors for product and species groups, and to supplement the standing tree-volume study.

4. Estimates of growth, removals, and mortality were determined from the remeasurement of 6,202 permanent sample plots which were established in the third survey. 4 1971 survey of timber products output, conducted by the Georgia Forestry Commission, along with the annual pulpwood production study in the South, provided additional information for breakdowns of removals by product.

5. Ownership information was collected from local contacts, correspondence, and public records. In those counties where the sample missed a particular ownership class, temporary samples were added and measured to describe the forest conditions within the ownership class.

6. A test study of procedures for measuring past treat-

ments and disturbances, better describing existing forest conditions, and determining future **silvicultural** opportunities for increasing timber growth was conducted in conjunction with the Georgia survey. Special classifications were recorded at each of the 6,086 ground sample locations which fell within the commercial forest. Those sample locations which straddled two or more conditions were identified to facilitate the analysis.

7. Throughout the State, an attempt was made to improve the breakdowns of land and water area provided by the Bureau of the Census. It is believed that this effort **strengthened** the individual county statistics generated by the Forest Survey.

8. All field data were sent to Asheville for editing and were punched in cards and stored on magnetic tape for computer processing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

9. As each of the five Forest Survey Units in Georgia was completed, special summaries of the information were added to a master data bank of Forest Survey statistics maintained for the entire Southeast in Asheville. A Forest Information Retrieval (FIR) program is available for compiling the information for any area of interest as a customized service.

ACCURACY OF THE SURVEY

Statistical analysis of the data indicates a sampling error of ± 0.21 percent for the estimate of total commercial forest area, 1.04 percent for total cubic volume, 1.09 percent for total cubic-volume growth, and 2.69 percent for total cubic-foot removals. As the totals are broken down by forest type, species, tree diameter, and other subdivisions, the sampling error increases. The order of this increase is suggested in the following tabulation, which shows the sampling error to which the estimates are liable, in terms of one standard error, or two chances out of three.

Sampling error ¹	Commercial forest area	Volume of growing stock		
		Inventory	Net growth	Removals
	Thousand acres	— Million	cubic feet	• • •
Percent				
1	1,095.4	6,849.8	468.5	—
2	273.8			—
3	121.7	3,044.4	208.2	818.3
4	68.5	1,712.5	117.1	460.3
5	43.8	1,096.0	75.0	294.6
10	11.0	274.0	18.7	73.6
15	4.9	121.8	8.3	32.7
20	2.7	68.5	4.7	18.4
25	1.8	43.8	3.0	11.8

¹By random-sampling formula.

DEFINITIONS OF TERMS

trees.—Growing-stock trees of commercial species that meet specified standards of size and quality, but not qualifying as desirable trees.

Available cut.—The volume of timber that would be available for cutting on commercial forest land during a given period under specified assumptions concerning growth, cut, mortality, and forest management practices.

Basal area.—The area in square feet of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed as square feet of basal area per acre.

Commercial **forest land.**—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization.

Commercial species. —Tree species suitable for industrial wood products.

Crop&rd.—Land under cultivation within the past 24 months, including orchards and land in soil-improving crops, but excluding land cultivated in developing improved pasture. Also includes idle farmland.

Desirable trees.—Growing-stock trees of commercial species having no serious defects in quality that limit present or prospective use for timber products, of relatively high vigor, and containing no pathogens that may result in death or serious deterioration before rotation age.

Diameter **class.**—A classification of trees based on diameter outside bark (d.o.b.), measured at breast height (4½ feet above the ground). D.b.h. is the common abbreviation for “diameter at breast height.” Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the h-inch class includes trees 3.00 through 6.99 inches d.b.h., inclusive.

Farm.—Either a place operated as a unit of 10 or more acres from which the sale of agricultural products totaled \$50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products for the year amounted to at least \$250.

Farm operator.—A person who operates a farm, either doing the work himself or directly supervising the work.

Farmer-owned lands.—Lands owned by farm operators.

Forest industry lands.—Lands owned by companies or individuals operating wood-using plants.

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Forest type.—A classification of forest land based upon the species forming a plurality of live-tree stocking.

Longleaf-slash pine. — Forests in which longleaf or slash pine, singly or in combination, comprises a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Loblolly-shortleaf pine. — Forests in which loblolly pine, shortleaf pine, or other southern yellow pines, except longleaf or slash pine, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Oak-pine. — Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking but in which pines comprise 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory. — Forests in which upland oaks or hickory, singly or in combination, comprises a plurality of the stocking, except where pines comprise 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum-cypress. — Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, comprises a plurality of the stocking, except where pines comprise 25 to 50 percent, in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood. — Forests in which elm, ash, or cottonwood, singly or in combination, comprises a plurality of the stocking. (Common associates include willow, sycamore, beech, and maple.)

Gross growth.—Annual increase in net volume of trees in the absence of cutting and mortality.

Growing-stock trees.—Live trees of commercial species qualifying as desirable or acceptable trees.

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. (Net volume in primary forks is included.)

Hardwoods. — Dicotyledonous trees, usually broad-leaved and deciduous.

Soft hardwoods. — Soft-textured hardwoods such as boxelder, red and silver maple, hackberry, loblolly-bay, sweetgum, yellow-poplar, magnolia, sweetbay, water tupelo, blackgum, sycamore, cottonwood, black cherry, willow, basswood, and elm.

Hard hardwoods. — Hard-textured hardwoods such as Florida maple, birch, hickory, dogwood, persimmon (forest grown), beech, ash, honeylocust, holly, black walnut, mulberry, and all commercial oaks.

Idle farmland.—Includes former croplands, orchards, improved pastures and farm sites not tended within the past 2 years, and presently less than 16.7 percent stocked with trees.

Improved pasture.—**Land** currently improved for grazing by cultivation, seeding, irrigation, or clearing of trees or brush.

Industrial wood.—**All** roundwood products except fuelwood.

Ingrowth.—**The** number or net volume of trees that grow large enough during a specified year to qualify as saplings, poletimber, or sawtimber.

Inhibiting vegetation.—Cover sufficiently dense to prevent the establishment of tree seedlings.

Land area.—**The** area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than $\frac{1}{8}$ of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

Log grade.—A classification of logs based on external characteristics as indicators of quality or value.

Logging residues.—The unused portions of trees cut or killed by logging.

Miscellaneous Federal lands.—Federal lands other than National Forests, lands administered by the Bureau of Land Management, and Indian lands.

Miscellaneous private lands-corporate. — Lands owned by private corporations other than forest industry.

Miscellaneous private lands-individual. — Privately owned lands other than forest industry, farmer-owned, or corporate lands.

Mortality.—Number or sound-wood volume of live trees dying from natural causes during a specified period.

National Forest land.—Federal lands which have been legally designated as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net annual growth.—The increase in volume for a specific year.

Net volume.—Gross volume of wood less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—(a) Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and (b) productive-reserved forest land.

Noncommercial species. — Tree species of typically small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests and land formerly forested where timber production is precluded by development for other uses.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other Federal lands.—Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and other Federal agencies.

Other public lands.—Publicly owned lands other than National Forests.

Other removals.—**The** net volume of growing-stock trees removed from the inventory by cultural operations, such as timber stand improvement, land clearing, and other changes in land use that result in the removal of the trees from the commercial forest.

Overstocked areas.—Areas where growth of trees is significantly reduced by excessive numbers of trees.

Plant byproducts.—**Wood** products, such as pulp chips, obtained incidental to production of other manufactured products.

Plant residues.—**Wood** materials from manufacturing plants not utilized for some product.

Poletimber trees.—Growing-stock trees of commercial species at least 5.0 inches in d.b.h. but smaller than sawtimber size.

Productive-reserved forest land. — Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute or administrative designation.

Quality class.—A classification of sawtimber volumes by log or tree grades.

Rangeland.—**Land** on which the natural plant cover is composed principally of native grasses, forbs, or shrubs valuable for forage.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log, or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, primarily because of rot or missing sections, and with less than one-third of the gross tree volume in sound material.

Rough trees.—(a) Live trees of commercial species that do not contain at least one 12-foot saw log, or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross tree volume in sound material; and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections cut from trees for industrial or consumer uses.

Salvable dead trees.—Standing or down dead trees that are considered merchantable by Forest Survey standards.

Saplings.—Live trees 1.0 inch to 5.0 inches in diameter at breast height.

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods).

Saw-log **portion.**—That part of the bole of sawtimber trees between the stump and the saw-log top.

Saw-log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw-log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber tree.—Live trees of commercial species containing at least a 12-foot saw log, or two noncontiguous saw logs, each 8 feet or longer, and with at least one-third of the gross board-foot volume between the 1-foot stump and minimum saw-log top being sound. Softwoods must be at least 9.0 inches and hardwoods at least 11.0 inches in diameter at breast height.

Sawtimber t&me.—Net volume of the saw-log portion of live sawtimber in board-foot International */'-inch rule.

Seedlings.—Live trees less than 1.0 inch in diameter at breast height that are expected to survive and develop.

Site **class.**—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Class 1.—Sites capable of producing 165 or more cubic feet per acre annually.

Class 2.—Sites capable of producing 120 to 165 cubic feet per acre annually.

Class 3.—Sites capable of producing 85 to 120 cubic feet per acre annually.

Class 4.—Sites capable of producing 50 to 85 cubic feet per acre annually.

Class S.—Sites incapable of producing 50 cubic feet per acre annually, but excluding unproductive sites.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Pines.—Yellow pine species which include loblolly, longleaf, slash, pond, shortleaf, sand, and spruce pine.

Other **softwoods.**—Cypress, eastern redcedar, and whitecedar.

Stand-size class.—A classification of forest land based on the diameter class of growing-stock trees on the area.

Sawtimber stands.—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking

in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.—Stands at least 16.7 percent stocked with **growing-stock trees** of which more than half of the stocking is saplings and seedlings.

State, **county, and** municipal lands.—Lands owned by States, counties, and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area or the number of trees in a stand and spacing in the stand, compared to a minimum standard, depending on tree size, to fully utilize the **growth** potential of the land. (See table at end of definitions.)

Fully stocked.—100 percent or more stocking

Medium stocked.—60 to 100 **percent** stocking

Poorly stocked.—Less than 60 percent stocking

Survivor growth.—The increase in volume of growing-stock trees that survive cutting and mortality for a specified year.

Timber products.—Roundwood products and plant byproducts.

Timber removals.—The net volume of growing-stock trees removed from the inventory by harvesting; **cultural** operations, such as stand improvement; land clearing, or changes in land use.

Unproductive forest land.—Forest land incapable of producing 20 cubic feet per acre of industrial wood under natural conditions, because of adverse site conditions.

Upper-stem portion.—That part of the main stem or fork of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the main **stem** or fork breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; school yards; cemeteries; roads; railroads; airports; beaches; powerlines and other **rights-of-way**; or other nonforest land not included in any other specified land use class.

Stocking Standard

D.b.h. class	Minimum number of trees per acre for full stocking	Minimum basal area per acre for full stocking	Percent stocking assigned each tally tree ¹
Seedlings	600	—	5.0
2	560	—	5.4
4	460	—	6.5
6	340	67	5.8
8	240	84	4.8
10	155	85	4.3
12	115	90	4.0
14	90	96	3.8
16	72	101	3.7
18	60	106	3.5
20	51	111	3.5

¹Trees less than 5.0 inches d.b.h. were tallied on a IO-point cluster of circular, 1/300-acre plots at each sample location. Trees 5.0 inches d.b.h. and larger were tallied on a IO-point cluster of variable plots with a basal area factor of 37.5 at each sample location.

Overstocked-Over 130 percent
 Fully stocked-100-130 percent
 Medium stocked-60-99 percent
 Poorly stocked-16.7-59 percent
 Nonstocked-Less than 16.7 percent

CONVERSION FACTORS Cubic feet of wood per average cord (excluding bark)

D.b.h.	Pine	Other softwoods	Hardwood
6	61.0	68.2	60.0
8	68.1	16.0	68.4
10	73.1	81.3	73.4
12	76.7	85.2	16.4
14	79.4	88.2	78.4
16	81.6	90.4	79.8
18	83.3	92.3	80.8
20	84.8	94.0	81.5
22	86.0	95.0	82.1
24+	87.1	98.1	83.1
Average	12.4	83.2	73.6

Rough cords per M cubic feet (without bark) =

$$a + b \left(\frac{1}{D.b.h.} \right) + c \left(\frac{1}{D.b.h.} \right)^2$$

Where

Pine	Other softwoods	Hardwood
$b = \frac{10.01650}{1000}$	$28.75783 \quad 9.15900$	$3.74431 \quad 10$
$c = 22.73994$	25.54418	157.39417

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Table 1. — Area by land classes, Georgia, 1972

Land class	Area
	Thousand Acres
Forest land:	
Commercial	24,839.0
Productive-reserved	383.7
Unproductive	30.2
Total	25,252.9
Nonforest land:	
Cropland	6,279.7
Pasture and range	2,825.7
Other ¹	3,021.4
Total	12,126.8
All land ²	37,379.7

¹Includes swampland, industrial and urban areas, other nonforest land, and 350,500 acres classed as water by Forest Survey standards but defined by Bureau of Census as land.

²From U. S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2. — Area of commercial forest land, by ownership classes, Georgia, 1972

Ownership class	Area
	Thousand acres
National Forest	839.3
Other Federal:	
Bureau of Land Management	—
Indian	—
Miscellaneous Federal	604.4
Total other Federal	604.4
State	93.7
County and municipal	34.1
' Forest industry'	4,318.2
Farmer-owned	8,410.1
Miscellaneous private:	
Individual	9,088.1
Corporate	1,451.1
Total miscellaneous private	10,539.2
All ownerships	24,839.0

¹Not including 948,700 acres of farmer-owned and miscellaneous private lands leased to forest industry.

Table 3. — Area of commercial forest land, by stand-size and ownership classes, Georgia, 1972

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
Sawtimber	8,791.4	560.2	347.3	1,304.2	6,579.7
Poletimber	9,038.2	235.4	192.2	1,276.7	7,333.9
Sapling and seedling	6,350.6	43.7	159.3	1,598.9	4,548.7
Nonstocked	658.8	—	33.4	138.4	487.0
All classes	24,839.0	839.3	732.2	4,318.2	18,949.3

Table 4. — Area of commercial forest land, by stand-volume and ownership classes, Georgia, 1972

Stand volume per acre ¹	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
Less than 1,500 board feet	11,176.7	116.9	291.1	2,347.5	8,421.2
1,500 to 5,000 board feet	8,639.2	340.7	231.0	1,111.8	6,955.7
More than 5,000 board feet	5,023.1	381.7	210.1	858.9	3,572.4
All classes	24,839.0	839.3	732.2	4,318.2	18,949.3

¹International 1/4-inch rule.

Table 5. — Area of commercial forest land, by stocking classes based on selected stand components, Georgia, 1972

Stocking percentage	Stocking classified in terms of:					
	All live trees	Growing-stock trees			Rough and rotten trees	Inhibiting vegetation
		Total	Desirable	Acceptable		
				Thousand	acres	
160	7.9	4.8	—	—	—	—
150-159	148.2	45.1	—	13.9	—	—
140-149	346.8	137.4	16.5	36.9	—	—
130-139	1,187.3	431.1	17.0	84.0	—	—
120-129	3,005.8	1,037.0	43.2	289.9	4.1	—
110-119	4,362.9	1,949.3	86.4	464.9	15.8	—
100-109	4442.3	2,844.0	229.9	838.1	27.4	—
						7.1
90-99	2,471.5	3,521.6	474.2	1,335.6	160.5	30.5
70-79	1,767.1	3,181.8	1,298.6	1,709.0	159.8	49.1
60-69	1,220.1	2,642.2	1,920.6	2,000.5	335.6	74.0
50-59	881.8	2,014.3	2,371.2	2,379.1	711.3	112.2
40-49	514.6	1,234.2	2,716.6	2,688.4	1,371.8	265.4
30-39	352.3	909.5	3,124.7	3,008.9	2,204.0	505.2
20-29	211.8	553.6	2,880.9	3,073.4	3,746.7	816.0
10-19	137.6	373.3	2,920.0	2,797.1	5,811.9	1,825.2
Less than 10	138.8	374.5	6,007.1	3,083.7	10,299.6	21,154.3
Total	24,839.0	24,839.0	24,839.0	24,839.0	24,839.0	24,839.0

Table 6. — Area of commercial forest land, by ownership and stocking classes, with percent occupancy by selected stand components, Georgia, 1972

Ownership and stocking class	Area	Stand components					
		Growing-stock trees			Rough and rotten trees	Inhibiting vegetation	Nonstocked
		Total	Desirable	Acceptable			
	<i>M acres</i>	<i>Percent of area</i>					
National Forest:					7.4		0.5
Fully stocked stands	450.7	92.3	20.2	58.9	25.0	0.5	2.2
Poorly stocked stands	223.5	46.5	8.5	38.0	45.7	1.4	6.4
All stands	839.3	70.2	20.4	49.8	26.4	0.6	2.8
Other public:							
Fully stocked stands	202.2	94.0	32.7	61.3	5.6	0.1	0.3
Medium stocked stands	305.3	75.6	36.9	38.7	12.1	4.4	1.9
Poorly stocked stands	221.7	38.9	21.8	17.1	26.4	10.6	24.1
All stands	132.2	74.1	32.1	42.6	12.7	4.1	8.5
Forest industry:							
Fully stocked stands	1,212.1	92.9	40.9	52.0	6.2	0.2	0.7
Medium stocked stands	2,199.7	70.7	43.0	32.7	12.6	3.6	8.1
Poorly stocked stands	346.4	36.6	22.1	14.5	19.6	13.3	30.5
All stands	4,318.2	74.4	38.6	35.8	11.7	4.2	9.7
Farmer & misc. private:							
Fully stocked stands	4,820.4	92.4	37.0	55.4	6.7	0.3	0.6
Medium stocked stands	9,960.9	75.7	33.5	42.2	16.5	2.5	5.3
Poorly stocked stands	4,168.0	38.9	19.2	19.7	26.8	10.8	23.5
All stands	18,949.3	72.1	31.5	41.2	15.9	3.6	7.8
All ownerships:							
Fully stocked stands	6,448.4	92.6	37.4	55.2	6.6	0.2	0.6
Medium stocked stands	12,931.0	75.6	35.1	40.5	15.7	2.8	5.9
Poorly stocked stands	5,459.6	38.8	19.6	19.2	26.2	10.9	24.1
All stands	24,839.0	73.1	32.6	40.5	15.2	3.1	8.0

*Based on degree of growing-stock stocking.

Table 7. — Area of commercial forest land, by site and ownership classes, Georgia, 1972

Site class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
<i>Thousand acres</i>					
165 cu. ft. or more	146.1	54.7	—	15.3	76.1
120 to 165 cu. ft.	550.1	43.0	22.9	74.0	410.2
85 to 120 cu. ft.	5,892.2	186.8	145.4	944.1	4,615.9
so to 85 cu. ft.	16,686.9	414.4	520.5	3,108.7	12,583.3
Less than 80 cu. ft.	1,563.7	80.4	43.4	176.1	1,263.8
All classes	24,839.0	839.3	132.2	4,318.2	18,949.3

Table 8. — Area of commercial forest land, by forest types and ownership classes, Georgia, 1972

Type	All ownerships	Public	Private
<i>Thousand acres</i>			
Softwood types:			
White pine-hemlock	31.4	26.5	—
Longleaf pine	820.6	49.5	771
Slash pine	4,527.6	142.8	4,384
Loblolly pine	5,014.9	276.5	4,731
Shortleaf pine	1,280.9	78.0	1,202
Pond pine	222.3	13.6	208
Virginia pine	377.1	49.5	321
Spruce pine	5.9	—	—
Pitch pine	13.0	13.0	—
Sand pine	3.5	—	—
Redcedar	27.3	—	2
Total	12,325.1	649.4	11,671
Hardwood types:			
Oak-pine	4,142.9	254.3	3,888
Oak-hickory	4,705.1	552.2	4,152
Southern scrub oak	465.7	28.6	43
Oak-gum-cypress	2,615.8	70.5	2,544
Elm-ash-cottonwood	584.4	16.5	56
Total	12,513.9	922.1	11,591
All types	24,839.0	1,571.5	23,262

Table 9. — Area of noncommercial forest land, by forest types, Georgia, 1972

Type	All areas	Productive-reserved areas	Unproductive areas
	* * Thousand acres . .		
Longleaf-slash pine	45.5	45.5	—
Loblolly-shortleaf pine	8.6	8.6	—
Oak-pine	35.1	35.1	—
Oak-hickory	13.1	13.1	—
Oak-gum-cypress	311.6	281.4	30.2
Elm-ash-cottonwood	—	—	—
All types	413.9	383.7	30.2

Table 10. — Number of growing-stock trees on commercial forest land, by species and diameter classes, Georgia, 1972

Species	Au Classes	Diameter class (inches at breast height)									
		5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0 and larger
----- Thousand trees -----											
Softwood :											
Longleaf pine	105,528	3 1,924	25,080	21,291	15,785	7,838	2,558	704	236	112	—
Slash pine	541,112	299,411	133,762	57,075	29,022	13,466	5,399	1,786	741	435	15
Loblolly pine	300,803	335,106	178,373	96,690	50,493	33,989	15,888	7,024	2,704	1,714	51
Shortleaf pine						7,554	2,325	785	209	91	3
Other yellow pines	107,077	50,051	28,427	15,370	7,631	3,192	1,539	573	142	145	7
Eastern white pine	8,985	3,080	1,480	1,308	997	536	680	302	283	303	16
Eastern hemlock	857	227	185	265	52	30	24	19	25	10	—
Baldcypress	8,818	2,549	2,048	1,160	929	9 :	641	278	141	135	21
Pondcypress	54,665	22,926	13,486	8,533	5,470	2,499	1,124	366	124	129	8
Other eastern softwoods	3,956	2,412	836	382	207	62	49	—	5	—	7
Total softwoods	1,865,075	901,135	463,083	242,466	138,357	70,072	30,233	11,842	4,604	3,149	134
Hardwood:											
Select white oaks ¹	72,899	29,274	17,024	11,347	6,632	4,264	1,967	975	662	696	58
Select red oaks ²	22,957	9,369	4,274	3,580	2,095	1,282	887	685	370	356	59
Other white oaks	68,573	26,010	16,485	10,534	6,235	4,098	2,284	1,209	820	739	159
Other red oaks	238,508	102,730	55,719	33,026	19,902	11,846	6,822	3,603	2,144	2,402	314
Hickory	72,684	31,421	16,720	10,294	6,459	3,787	2,004	1,065	436	478	20
Hard maple	1,178	666	188	170	44	59	28	15	—	8	—
Soft maple	55,849	22,776	14,116	8,781	4,693	2,591	1,360	874	315	319	24
Beech	1,563	200	141	193	216	325	123	174	71	111	9
Sweetgum	206,814	99,020	49,492	28,748	14,863	8,229	3,598	1,408	801	640	15
Tupelo and blackgum	182,640	69,604	45,226	30,629	18,264	10,438	4,976	2,064	719	674	46
Ash	22,657	8,136	6,135	3,515	2,285	1,265	590	342	159	159	11
Cottonwood	381	182	—	—	86	13	58	27	—	15	—
Basswood	930	393	111	159	134	51	55	19	—	8	—
Yellow-poplar	76,906	28,068	15,826	11,146	9,527	5,242	3,413	1,574	734	714	62
Black walnut	815	453	174	26	104	28	12	10	8	—	—
Black cherry	5,853	2,926	1,742	845	203	61	40	19	12	5	—
Bay and magnolia	30,411	14,385	7,162	4,020	2,429	1,436	546	253	116	51	13
Elm	19,269	8,296	4,765	2,482	1,665	1,168	501	221	107	61	3
Sycamore	2,070	506	480	367	231	177	147	93	21	43	5
Other eastern hardwoods	21,483	10,728	4,100	2,662	1,960	995	502	341	112	72	11
Total hardwoods	1,104,440	465,143	259,880	163,184	98,027	57,355	29,913	14,971	1,607	7,551	809
All species	2,969,515	1,366,278	722,963	405,650	236,384	127,427	60,146	26,813	12,211	10,700	943

¹Includes white and swamp chestnut oaks.

²Includes cherrybark, northern red, and Shumard oaks.

Table 11. — Volume of timber on commercial forest land, by class of timber and by softwood and hardwood, Georgia, 1972

Class of timber	All species	Softwood	Hardwood
• • Million cubic feet • •			
Sawtimber trees:			
Saw-log portion	14,126.2	8,868.5	5,257.7
Upper-stem portion	1,726.3	850.1	876.2
Total	15,852.5	9,718.6	6,133.9
Poletimber trees	9,479.7	5,050.3	4,429.4
All growing-stock trees	25,332.2	14,768.9	10,563.3
Rough trees:			
Sawtimber-size trees	127.2	73.5	653.7
Poletimber-size trees	1,260.2	122.9	1,137.3
Total	1,987.4	196.4	1,791.0
Rotten trees:			
Sawtimber-size trees	557.7	24.9	532.8
Poletimber-size trees	114.2	2.5	111.7
Total	671.9	27.4	644.5
Salvable dead trees:			
Sawtimber-size trees	28.4	18.3	10.1
Poletimber-size trees	11.9	7.8	4.1
Total	40.3	26.1	14.2
Total, all timber	28,031.8	15,018.8	13,013.0

Table 12. — Volume of growing stock and sawtimber on commercial forest land, by ownership classes and by softwood and hardwood, Georgia, 1972

Ownership class		Growing stock			Sawtimber		
		All species	Softwood	Hardwood	All species	Softwood	Hardwood
		Million cubic feet			Million board feet ¹		
National Forest		1,178.2	485.0	693.2	3,939.9	1,935.3	2,004.6
Other public land		1,005.8	709.7	296.1	3,498.4	2,712.7	785.7
Forest industry		4,273.7	2,605.7	1,668.0	12,278.6	7,660.7	4,617.9
Farmer and misc. private		18,874.5	10,968.5	7,906.0	52,481.8	33,346.2	19,135.6
All ownerships		25,332.2	14,768.9	10,563.3	72,198.7	45,654.9	26,543.8

¹International 1/4-inch rule.

Table 13. — Volume of growing stock on commercial forest land, by species and diameter classes, Georgia, 1972

Species	All classes	Diameter class (inches at breast height)									
		8.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0 and larger
..... Million cubic feet											
Softwood:											
Longleaf pine										9.4	—
Slash pine	3,779.2	777.3	875.8	288.6	515.4	393.2	297.4	95.4	50.0	35.9	2.8
Loblolly pine	6,109.9	806.4	1,013.9	1,042.5	1,067.0	908.1	585.3	348.9	174.1	155.1	8.6
Shortleaf pine	2,014.7	354.5	466.7	455.9	387.7	202.4	86.3	39.3	14.0	7.5	0.4
Other yellow pines	804.2	137.2	173.4	170.0	136.0	82.0	55.7	27.2	9.0	12.4	1.3
Eastern white pine											2.4
Eastern hemlock	153.9	8.8	8.9	13.8	17.0	0.5	24.12	14.8	18.3	31.1	2.1
Baldcypress	140.9	7.7	12.7	14.3	17.9	26.1	24.6	12.9	8.8	11.5	4.4
Pondcypress	484.7	71.8	89.7	94.5	96.8	62.1	36.8	16.0	6.9	8.9	1.2
Other eastern softwoods	17.0	4.7	3.9	3.0	2.1	1.2	0.9	—	0.3	—	0.3
Total softwoods	14,768.9	2,261.7	2,788.6	2,830.9	2,666.5	1,906.2	1,128.6	590.9	296.6	275.4	23.5
Hardwood:											
Select white oaks¹	746.3	76.5	98.5	124.0	113.3	108.4	68.1	43.6	38.9	64.1	10.9
Select red oaks²	297.9	27.7	26.9	38.6	37.3	33.9	31.7	31.8	23.0	35.3	11.7
Other white oaks	711.3	60.9	88.6	102.9	98.9	94.6	72.5	48.7	43.3	67.2	33.7
Other red oaks	2,329.0	264.5	319.1	342.5	323.3	219.6	220.2	154.6	119.5	239.8	65.9
Hickory	678.2	70.4	91.8	104.3	111.3	96.7	72.0	50.8	28.6	47.9	4.4
Hard maple	8.7	2.3	0.9	1.8	0.5	1.2	0.9	0.6	—	0.5	—
Soft maple	513.9	65.4	83.5	94.7	78.7	63.1	43.1	37.0	15.4	29.2	3.8
Beech	42.1	0.5	1.0	2.0	3.8	8.7	4.5	7.6	4.4	8.7	1.5
Sweetgum	1,652.5	212.1	282.7	324.6	285.1	226.5	136.6	68.0	52.1	61.7	3.1
Tupelo and blackgum	1,721.6	184.4	274.2	332.2	320.9	261.5	160.5	86.3	34.8	59.7	7.1
Ash	237.6	22.0	38.8	40.1	41.4	32.5	21.3	14.4	9.0	15.2	2.3
Cottonwood	7.6	0.5	—	—	1.7	0.4	2.0	1.3	—	1.7	—
Basswood	12.0	1.4	0.5	2.3	2.4	1.7	2.0	1.1	—	0.6	—
Yellow-poplar	921.8	74.8	97.2	133.1	172.4	138.7	120.0	70.3	43.1	60.6	11.6
Black walnut	5.5	1.1	1.0	0.2	1.5	0.6	0.3	0.4	0.4	—	—
Black cherry	35.0	1.5	10.7	8.8	3.1	1.5	1.3	1.1	0.7	0.3	—
Bay and magnolia	251.4	41.8	46.5	43.7	44.1	36.1	17.3	10.0	5.5	4.5	1.9
Elm	174.9	18.1	26.2	25.5	30.3	31.2	18.8	10.2	6.9	7.2	0.5
Sycamore	32.9	1.7	3.9	4.3	4.2	4.5	4.8	4.0	1.1	3.8	0.6
Other eastern hardwoods	182.5	26.1	24.2	27.3	33.9	24.4	17.4	14.1	6.7	6.3	1.5
Total hardwoods	10,563.3	1,160.3	1,516.2	1,752.9	1,708.1	1,445.8	1,015.3	655.9	434.0	714.3	160.5
All species	25,332.2	3,422.0	4,304.8	4,583.8	4,374.6	3,352.0	2,143.9	1,246.8	730.6	989.7	184.0

¹Includes white and swamp chestnut oaks.

²Includes cherrybark, northern red, and Shumard oaks.

Table 14. Volume of sawtimber on commercial forest land, by species and diameter classes. Georgia, 1972

Species	A 1 classes	Diameter class (inches at breast height)							
		9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0 and larger
----- Million board feet -----									
Softwood:									
Longleaf pine	4,776.1	1,173.4	1,564.9	1,156.7	550.4	196.6	76.1	58.0	—
Slash pine	9,940.4	2,859.5	2,852.5	2,030.6	1,182.1	526.1	279.2	194.9	15.5
Loblolly pine	20,782.7	3,803.9	4,961.3	4,730.4	3,326.5	1,976.2	1,017.5	914.0	52.9
Shortleaf pine	5,294.5	1,670.6	1,767.0	1,028.4	474.2	222.7	82.8	45.9	2.9
Other yellow pines	2,146.0	589.2	587.5	402.2	293.4	144.1	52.0	70.1	7.5
Eastern white pine	704.5	47.1	72.8	63.5	124.9	81.6	105.6	193.6	15.4
Eastern hemlock	72.3	11.1	4.1	2.4	6.1	7.3	7.7	19.4	14.2
Baldcypress	560.6	33.5	68.0	126.0	132.8	66.8	46.2	62.8	24.5
Pondcypress	1,343.8	300.4	393.7	291.2	187.5	84.0	36.4	44.7	5.9
Other eastern softwoods	34.0	11.3	10.3	5.0	4.2	—	1.9	—	1.3
Total softwoods	45,654.9	10,500.0	12,282.1	9,836.4	6,282.1	3,305.4	1,705.4	1,603.4	140.1
Hardwood:									
Select white oaks ¹	1,955.4	—	378.7	441.4	313.3	212.3	200.7	344.5	64.5
Select red oaks ²	898.4	—	122.7	132.9	137.7	150.4	113.0	177.9	63.8
Other white oaks	1,904.3	—	327.5	362.5	310.6	222.3	215.5	324.7	141.2
Other red oaks	6,174.6	—	1,099.2	1,140.1	1,023.5	767.0	617.8	1,200.6	326.4
Hickory	1,822.4	—	374.4	399.4	351.0	259.2	151.4	261.4	25.6
Hard maple	17.3	—	2.1	5.8	4.7	2.1	—	2.6	—
Soft maple	1,089.3	—	244.9	242.9	183.3	177.3	77.8	142.8	20.3
Beech	180.0	—	12.4	36.9	22.2	36.4	22.8	42.4	6.9
Sweetgum	3,695.8	—	1,032.7	999.3	693.8	354.0	282.2	316.9	16.9
Tupelo and blackgum	3,722.5	—	1,002.9	1,035.1	730.1	441.0	182.3	297.8	33.3
Ash	555.3	—	123.4	127.0	98.3	69.4	48.7	79.3	9.2
Cottonwood	35.6	—	6.6	2.3	9.3	7.5	—	9.9	—
Basswood	31.7	—	7.8	7.1	8.1	5.8	—	2.9	—
Yellow-poplar	2,974.8	—	634.8	625.1	633.0	391.5	251.4	366.6	72.4
Black walnut	12.2	—	4.5	3.2	1.8	1.6	1.1	—	—
Black cherry	27.5	—	7.8	5.3	5.4	3.6	3.5	1.9	—
Bay and magnolia	487.8	—	149.0	146.0	78.5	50.0	29.2	22.8	12.3
Elm	429.1	—	99.6	119.7	87.6	48.3	34.9	35.8	3.2
Sycamore	106.3	—	13.2	18.1	22.5	21.7	7.0	20.1	3.7
Other eastern hardwoods	423.5	—	113.8	95.8	78.5	65.0	32.2	31.0	7.2
Total hardwoods	26,543.8	—	5,758.0	5,945.9	4,793.2	3,286.4	2,271.5	3,681.9	806.9
All species	72,198.7	10,500.0	18,040.1	15,782.3	11,075.3	6,591.8	3,976.9	5,285.3	947.0

¹Includes white and swamp chestnut oaks.

²Includes cherrypark, northern red, and Shumard oaks.

Table 15. — Volume of sawtimber on commercial forest land, by species and quality classes, Georgia, 1972

Species	All grades	Log or tree grade			
		1	2	3	4
		Million-board feet			
Softwood:					
Yellow pines ¹	42,939.1	11,571.4	4,754.4	26,613.9	(²)
Eastern white pine ³	704.5	42.3	202.2	460.0	—
Cypress ³	1,904.4	625.5	714.3	564.6	—
Other eastern softwood ³	106.3	—	1.2	105.1	—
	45,654.9	12,239.2	5,672.1	27,743.6	—
Hardwood: ⁴					
Select white and red oaks	2,853.8	941.2	529.2	1,205.2	178.2
Other white and red oaks	8,078.9	1,798.7	1,541.7	4,275.4	463.1
Hickory	1,822.4	283.5	348.6	1,097.9	92.4
Hard maple	17.3	1.5	5.2	10.6	—
Sweetgum	3,695.8	668.0	657.1	2,201.7	169.0
Ash, walnut, and black cherry	595.0	194.5	205.9	192.0	2.6
Yellow-poplar	2,974.8	619.1	635.5	1,576.9	143.3
Other hardwoods	6,505.8	1,126.8	1,358.9	3,864.5	155.6
Total	26,543.8	5,633.3	5,282.1	14,424.2	1,204.2
All species	72,198.7	17,872.5	10,954.2	42,167.8	1,204.2

¹ Based on *Southern Pine Tree Grades for Yard and Structural Lumber*, Research Paper SE-40, published by the Southeastern Forest Experiment Station in 1968.

²Not applicable.

³Based on *Trial Log Grades for Eastern White Pine* prepared by the Northeastern Forest Experiment Station in 1960.

⁴Graded according to *Hardwood Log Grades for Standard Lumber* published by the U. S. Forest Products Laboratory in 1953. Specifications for the grade 4 tie and timber logs are based chiefly on knot size and log soundness.

Table 16. — Net annual growth and removals of growing stock on commercial forest land, by species, Georgia, 1972

Species	Net annual growth	Annual timber removals
	Million	cubic feet
Softwood:		
Yellow pines	1,128.0	778.5
Eastern white pine	9.5	1.1
Cypress	12.7	3.9
Other eastern softwoods	2.9	0.3
Total softwoods	1,153.1	783.8
Hardwood:		
Select white and red oaks	44.3	24.2
Other white and red oaks	134.4	60.4
Hickory	19.9	13.7
Hard maple	0.4	—
Sweetgum	15.4	44.0
Ash, walnut, and black cherry	10.5	5.2
Yellow-poplar	59.0	21.4
Tupelo and blackgum	33.4	37.2
Other eastern hardwoods	46.8	21.9
Total hardwoods	424.1	234.0
All species	1,577.2	1,017.8

Table 17. — Net annual growth and removals of growing stock on commercial forest land, by ownership classes and by softwood and hardwood, Georgia, 1971

Ownership class	Net annual growth			Annual timber removals		
	All species	Soft-wood	Hard-wood	All species	Soft-wood	Hard-wood
	Million cubic feet					
National Forest	49.9	26.4	23.5	14.8	9.2	5.1
Other public	58.1	47.5	10.6	42.5	33.4	9.1
Forest industry	211.2	210.0	61.2	210.9	180.2	30.1
Farmer and misc. private	1,198.0	869.2	328.8	749.6	561.0	188.1
All ownerships	1,577.2	1,153.1	424.1	1,017.8	783.8	234.0

Table 18. — Net annual growth and removals of sawtimber on commercial forest land, by species, Georgia, 1971

Species	Net annual growth	Annual timber removals
<i>Million board feet</i>		
Softwood:		
Yellow pines	3,904.6	2,900.3
Eastern white pine	41.2	6.3
Cypress	57.1	11.7
Other eastern softwoods	5.2	—
Total softwoods	4,008.1	2,918.3
Hardwood:		
Select white and red oaks	141.5	90.5
Other white and red oaks	392.2	201.7
Hickory	60.5	58.2
Hard maple	0.6	—
Sweetgum	177.8	145.3
Ash, walnut, and black cherry	29.5	14.8
Yellow-poplar	215.1	97.7
Tupelo and blackgum	93.2	115.2
Other eastern hardwoods	124.2	64.8
Total hardwoods	1,234.6	788.2
All species	5,242.7	3,706.5

Table 19. — Net annual growth and removals of sawtimber commercial forest land, by ownership classes and by softwood and hardwood. Georgia, 1971

Ownership class	Net annual growth			Annual timber removal		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
<i>Million board feet</i>						
National Forest	184.7	108.5	76.2	61.0	35.4	2
Other public	229.5	196.7	32.8	164.7	134.8	2
Forest industry	904.9	712.1	192.8	761.1	664.0	9
Farmer and misc. private	3,923.6	2,990.8	932.8	2,719.7	2,084.1	63
All ownerships	5,242.7	4,008.1	1,234.6	3,706.5	2,918.3	78

Table 20. — Mortality of growing stock and sawtimber on commercial forest land by species. Georgia, 1971

Species	Growing stock	Sawtimber
<i>Million cu. ft.</i>		
Softwood:		
Yellow pines	82.0	202
Eastern white pine	—	3
Cypress	0.4	4
Other eastern softwoods	0.3	1
Total softwoods	84.2	211
Hardwood:		
Select white and red oaks	7.2	—
Other white and red oaks	21.1	15
Hickory	4.1	0
Hard maple	—	22
Sweetgum	9.2	4
Ash, walnut, and black cherry	3.2	11
Yellow-poplar	3.6	25
Tupelo and blackgum	7.5	31
Other eastern hardwoods	15.4	—
Total hardwoods	71.4	194
All species	155.6	406

Table 21. — Mortality of growing stock and sawtimber on commercial forest land, by ownership classes and by softwood and hardwood, Georgia, 1971

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
<i>Million cubic feet</i>						
National Forest	8.3	3.2	2.1	26.8	10.1	16.7
Forest industry	25.7	15.3	10.4	49.7	39.8	30.1
Farmer and misc. private	115.8	62.0	53.8	292.7	150.4	142.3
All ownerships	155.6	84.2	71.4	406.7	211.8	194.9

Table 22. — Mortality of growing stock and sawtimber on commercial forest land, by causes and by softwood and hardwood, Georgia, 1971

Cause of death	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
<i>Million cubic feet</i>						
Fire	9.2	6.2	0.1	19.5	13.8	5.7
Insects	11.2	11.1	—	44.7	44.7	—
Disease	20.9	15.2	5.7	54.6	39.1	15.5
Other	58.0	33.4	24.6	111.7	56.7	55.0
Unknown	56.3	18.3	38.0	116.2	57.5	118.7
All causes	155.6	84.2	71.4	406.7	211.8	194.9

Table 23. — Output of timber products, by product, by source of material, and by softwood and hardwood, Georgia, 1971

Product and species group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number of units	Thousand cu. ft.	Number of units	Thousand cu. ft.	Number of units	Thousand cu. ft.
Saw logs:							
Softwood	M bd. ft. ¹	1,220,867	241,738	1,208,196	239,229	12,671	2,509
Hardwood	M bd. ft. ¹	304,779	51,599	304,266	57,502	513	97
Total	M bd. ft. ¹	1,525,646	299,337	1,512,462	296,731	13,184	2,606
Veneer logs and bolts:							
Softwood	M bd. ft. ¹	153,247	27,147	153,247	27,147		
Hardwood	M bd. ft. ¹	76,742	13,200	76,142	13,200		
Total	M bd. ft. ¹	229,989	40,347	229,989	40,347		
Pulpwood: ²							
Softwood	Std. cords ³	6,431,032	479,047	5,343,014	398,001	1,088,018	81,046
Hardwood	Std. cords ³	827,088	62,528	621,245	46,966	205,843	15,562
Total	Std. cords ³	7,258,120	541,575	5,964,259	444,967	1,293,861	96,608
Cooperage:							
Softwood	M bd. ft. ¹		—	—	—	—	—
Hardwood	M bd. ft. ¹	531	89	531	89	—	—
Total	M bd. ft. ¹	531	89	531	89	—	—
Poles and piling:							
Softwood	M pieces	601	10,340	601	10,340	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	601	10,340	601	10,340	—	—
Posts (round and split):							
Softwood	M pieces	10,225	6,590	10,225	6,590	—	—
Hardwood	M pieces	—	—	—	—	—	—
Total	M pieces	10,225	6,590	10,225	6,590	—	—
Other: ⁴							
Softwood	M cu. ft.	16,932	16,932	1,241	1,241	15,691	15,691
Hardwood	M cu. ft.	4,521	4,521	1,501	1,501	3,020	3,020
Total	M cu. ft.	21,453	21,453	2,742	2,742	18,711	18,711
Total industrial products:							
Softwood		—	781,794	—	682,548	—	99,246
Hardwood		—	137,937	—	119,258	—	18,679
Total		—	919,731	—	801,806	—	117,925
Fuelwood: ⁵							
Softwood	Std. cords	35,092	5,629	24,580	4,867	10,512	762
Hardwood	Std. cords	41,476	6,962	33,881	6,403	7,595	559
Total	Std. cords	76,568	12,591	58,461	11,270	18,107	1,321
All products:							
Softwood		—	787,423	—	687,415	—	100,008
Hardwood		—	144,899	—	125,661	—	19,238
Total		—	932,322	—	813,076	—	119,246

¹International 1/4-inch rule.

²Roundwood figures include 243,349 cords of roundwood chipped at other primary wood-using plants.

³Rough-wood basis (includes chips converted to equivalent standard cords).

⁴Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, and chemical wood.

⁵Excludes approximately 9,054 thousand cubic feet of plant byproducts used for industrial fuel.

Table 24. — Output of roundwood products, by product, by source, and by softwood and hardwood, Georgia, 1971

Product and species group	All sources	Growing stock trees¹			Cull trees¹	Salvable dead trees¹	Other sources²
		Total	Saw-timber	Pole-timber			
..... Thousand cubic feet							
Saw logs:							
Softwood	239,229	232,251	214,134	18,117	2,782	—	4,196
Hardwood	57,502	56,417	55,017	1,400	1,022	—	63
Total	296,731	288,668	269,151	19,517	3,804	—	4,259
Veneer logs and bolts:							
Softwood	27,147	26,552	26,552	—	—	—	595
Hardwood	13,200	12,886	12,886	—	211	—	103
Total	40,347	39,438	39,438	—	211	—	698
Pulpwood:							
Softwood	398,001	366,280	220,421	145,859	9,063	163	22,495
Hardwood	46,966	44,150	21,448	22,702	2,096	—	720
Total	444,967	410,430	241,869	168,561	11,159	163	23,215
Cooperage:							
Softwood	—	—	—	—	—	—	—
Hardwood	89	86	86	—	—	—	3
Total	89	86	86	—	—	—	3
Poles and piling:							
Softwood	10,340	10,154	10,154	—	—	—	186
Hardwood	—	—	—	—	—	—	—
Total	10,340	10,154	10,154	—	—	—	186
Posts (round and split) :							
Softwood	6,590	4,312	300	4,012	957	—	1,321
Hardwood	—	—	—	—	—	—	—
Total	6,590	4,312	300	4,012	957	—	1,321
Other :							
Softwood	1,241	1,165	175	990	—	—	76
Hardwood	1,501	1,432	1,081	351	46	—	23
Total	2,742	2,597	1,256	1,341	46	—	99
Total industrial products:							
Softwood	682,548	640,714	471,736	168,978	12,802	163	28,869
Hardwood	119,258	114,971	90,518	24,453	3,375	—	912
Total	801,806	755,685	562,254	193,431	16,177	163	29,781
Fuel wood :							
Softwood	4,867	4,585	3,659	926	—	—	282
Hardwood	6,403	5,322	2,858	2,464	787	—	294
Total	11,270	9,907	6,517	3,390	787	—	576
All products:							
Softwood	687,415	645,299	475,395	169,904	12,802	163	29,151
Hardwood	125,661	120,293	93,376	26,917	4,162	—	1,206
Total	813,076	765,592	568,771	196,821	16,964	163	30,357

¹On commercial forest land.

²Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas, or material from noncommercial forest land or nonforest land such as fence rows or suburban areas.

Table 25. — Annual timber removals from growing stock on commercial forest land, by items and by softwood and hardwood, Georgia, 1971

Item	All species	Softwood	Hardwood
<i>Thousand cubic feet</i>			
Roundwood products:			
Saw logs	288,668	232,251	56,417
Veneer logs and bolts	39,438	26,552	12,886
Pulpwood	410,430	366,280	44,150
Cooperage logs and bolts	86	—	86
Poles and piling	10,154	10,154	—
Posts	4,312	4,312	—
Other	2,597	1,165	1,432
Fuelwood	9,907	4,585	5,322
All products	165,592	645,299	120,293
Logging residues	117,921	72,851	45,070
Other removals	134,258	65,711	68,547
Total removals	1,017,771	783,861	233,910

Table 26. — Annual timber removals from live sawtimber on commercial forest land, by items and by softwood and hardwood, Georgia, 1971

Item	All species	Softwood	Hardwood
<i>Thousand board feet</i>			
Roundwood products:			
Saw logs	1,466,172	1,180,544	285,628
Veneer logs and bolts	224,806	149,891	74,915
Pulpwood	1,041,421	987,032	54,389
Cooperage logs and bolts	511	—	511
Poles and piling	59,909	1,405	—
Posts	—	—	—
Other	4,634	633	4,001
Fuelwood	24,136	15,432	8,704
All products	2,822,994	2,394,846	428,148
Logging residues	398,510	265,177	133,333
Other removals	484,919	258,208	226,711
Total removals	3,706,423	2,918,231	788,192

Table 27. — Volume of unused residues at primary manufacturing plants, by industry and type of residue, and by softwood and hardwood, Georgia, 1971

Species group and type of residues	All industries	Lumber	Veneer and plywood	Other
<i>Thousand cubic feet</i>				
Softwoods:				
Coarse ¹	2,604	2,562	6	36
Fine*	24,831	24,712	21	98
Total	27,435	27,274	27	134
Hardwoods:				
Coarse ¹	3,383	2,719	148	516
Fine ²	10,533	9,775	757	1
Total	13,916	12,494	905	517
All species:				
Coarse ¹	5,987	5,281	154	552
Fine*	35,364	34,487	778	99
Total	41,351	39,768	932	651

¹Material, such as slabs, edgings, and veneer cores.

*Material, such as sawdust and shavings.

Table 28. — Projection of net annual growth, available cut, and inventory of softwood and growing stock on commercial forest land, by softwood and hardwood, Georgia, 1971 to 2001¹

Species group		Projected to:			
		1971			
			1981	1991	2001
<i>GROWING STOCK (In thousand cubic feet)</i>					
Softwood:					
cut		783,800	1,012,500	1,168,200	1,260,200
Growth		1,153,100	1,282,800	1,307,700	1,260,200
Inventory*		14,768,900	17,667,100	19,273,300	19,537,300
Hardwood:					
cut		234,000	319,400	404,300	473,100
Growth		424,100	465,900	484,000	473,100
Inventory*		10,563,300	12,030,400	12,880,000	13,000,800
Total:					
cut		1,017,800	1,331,900	1,572,500	1,733,300
Growth		1,577,200	1,748,700	1,791,700	1,733,300
Inventory*		25,332,200	29,697,500	32,153,300	32,538,100
<i>SAWTIMBER (In thousand board feet)</i>					
Softwood:					
cut		2,918,300	3,780,300	4,577,000	5,061,700
Growth		4,008,100	4,867,000	5,175,900	5,061,700
Inventory%		45,654,900	56,885,400	63,932,200	65,486,200
Hardwood:					
cut		788,200	981,800	1,171,800	1,308,900
Growth		1,234,600	1,331,600	1,357,100	1,308,900
Inventory*		26,543,800	30,096,700	32,058,200	32,286,000
Total:					
cut		3,706,500	4,762,100	5,748,800	6,370,600
Growth		5,242,700	6,198,600	6,533,000	6,370,600
Inventory*		72,198,700	86,982,100	95,990,400	97,772,200

¹Assumptions:

1. Area of commercial forest land will decline at the rate of 50,000 acres each year.

2. Forestry progress will continue at the rate indicated by recent trends.

3. Cut starting at the 1971 level will gradually increase and come into balance with growth by year 2001.

*Inventory as of January 1 of the following year.

Table 29. — Basal area per acre of growing stock and rough and rotten trees 5.0 inches d.b.h. and larger, by forest type and Survey Unit, Georgia. 1972

Forest type	State	South-east	South-west	Central	North Central	North
----- Square feet -----						
White pine-hemlock:						
Growing stock	118.6	—	—	—	—	118.6
Rough and rotten trees	13.5	—	—	—	—	13.5
All trees	132.1	—	—	—	—	132.1
Longleaf-slash pine:						
Growing stock	40.1	38.8	42.0	44.0	69.4	86.4
Rough and rotten trees	1.5	1.3	1.9	1.6	1.6	—
All trees	41.6	40.1	43.9	45.6	77.0	86.4
Loblolly-shortleaf pine:						
Growing stock	56.2	49.1	48.3	55.6	58.8	61.2
Rough and rotten trees	3.4	3.2	3.5	2.6	3.4	6.9
All trees	59.6	52.3	51.8	58.2	62.2	68.1
Oak-pine :						
Growing stock	45.6	41.6	39.5	46.4	53.0	49.0
Rough and rotten trees	7.7	6.8	8.9	6.3	6.6	14.2
All trees	53.3	48.4	48.4	52.7	59.6	63.2
Oak-hickory:						
Growing stock	41.1	32.4	26.1	40.7	52.5	46.4
Rough and rotten trees	12.3	10.7	12.4	9.4	11.9	18.2
All trees	53.4	43.1	38.5	50.1	64.4	64.6
Oak-gum-cypress:						
Growing stock	65.1	64.7	61.6	69.6	65.7	—
Rough and rotten trees	18.8	21.2	18.5	14.2	16.5	—
All trees	83.9	85.9	80.1	83.8	82.2	—
Elm-ash-cottonwood:						
Growing stock	59.2	64.9	55.4	62.3	55.2	38.9
Rough and rotten trees	17.7	23.6	16.0	14.3	17.6	22.1
All trees	76.9	88.5	71.4	76.6	72.8	61.0
All types:						
Growing stock	48.8	44.3	44.1	51.2	56.4	52.1
Rough and rotten trees	7.5	7.0	8.1	6.1	6.7	13.8
All trees	56.3	51.3	52.2	57.3	63.1	65.9

Table 30. — Number of growing stock and rough and rotten trees 1.0-4.9 inches d.b.h. per acre, by forest type and Survey Unit, Georgia, 1972

Forest type	State	South-east	South-west	Central	North Central	North
----- Number of trees -----						
White pine-hemlock:						
Growing stock	300	—	—	—	—	300
Rough and rotten trees	320	—	—	—	—	320
All trees	620	—	—	—	—	620
Longleaf-slash pine:						
Growing stock	302	303	306	281	200	400
Rough and rotten trees	82	83	78	86	200	400
All trees	384	386	384	367	400	800
Loblolly-shortleaf pine:						
Growing stock	436	344	319	454	456	439
Rough and rotten trees	207	119	154	185	200	412
All trees	643	463	473	639	656	851
Oak-pine:						
Growing stock	332	340	350	347	310	290
Rough and rotten trees	339	277	228	340	396	527
All trees	671	617	578	687	706	817
Oak-hickory:						
Growing stock	231	198	208	278	244	180
Rough and rotten trees	367	262	234	364	380	494
All trees	598	460	442	642	624	674
Oak-gum-cypress:						
Growing stock	344	384	314	311	192	—
Rough and rotten trees	325	369	255	292	375	—
All trees	669	753	569	603	567	—
Elm-ash-cottonwood:						
Growing stock	148	166	175	170	94	150
Rough and rotten trees	320	379	425	279	244	625
All trees	468	545	600	449	338	775
All types:						
Growing stock	330	314	300	361	361	284
Rough and rotten trees	246	185	170	258	283	475
All trees	576	499	470	619	644	759

Table 31. — Area of commercial forest land, by stand volume (board feet) and ownership classes, by physiographic classes. Georgia, 1972

Ownership class and stand volume per acre' (Bd. ft.)	All classes	Physiographic class								
		Deep swamps	Broad stream margins	Narrow stream margins	Mountain tops and slopes	Flatwoods and dry pocosins	Bays and wet pocosins	Rolling uplands	Sandhills	Other misc. classes
----- Thousand acres -----										
National Forest:										
Less than 1,500	116.9	—	—	2.3	87.0	—	—	22.8	—	4.8
1,500 to 5,000	340.1	—	—	4.6	208.1	—	—	119.1	—	8.9
More than 5,000	381.7	—	3.9	16.3	200.9	—	—	154.3	—	6.3
All classes	839.3	—	3.9	23.2	496.0	—	—	296.2	—	20.0
Other public:										
Less than 1,500	291.1	4.0	0.1	24.4	—	100.9	10.5	139.8	0.5	10.3
1,500 to 5,000	231.0	—	6.0	26.5	3.9	88.0	—	104.2	—	2.4
More than 5,000	210.1	7.7	—	43.8	0.3	43.3	6.9	99.9	—	8.2
All classes	132.2	11.7	6.7	94.7	4.2	232.2	17.4	343.9	0.5	20.9
Forest industry:										
Less than 5,000	1,111.8	4.2	33.0	168.7	18.9	340.8	29.0	1,327.0	38.1	40.1
More than 5,000	858.9	18.0	176.8	170.2	6.2	137.2	18.4	296.1	—	53.9
All classes	4,318.2	26.4	245.3	433.8	45.5	1,283.3	129.0	1,986.8	38.1	130.0
Farmer and misc. private:										
Less than 1,500	8,421.2	10.8	50.3	615.4	131.9	1,499.2	163.3	5,547.3	190.8	212.2
1,500 to 5,000	6,955.7	35.1	173.5	1,159.9	226.3	812.9	115.3	4,239.2	21.4	172.1
More than 5,000	3,572.4	36.8	201.6	929.4	41.5	512.5	27.4	1,717.4	—	105.8
All classes	18,949.3	82.7	425.4	2,704.7	399.7	2,824.6	306.0	11,503.9	212.2	490.1
All ownerships:										
Less than 1,500	11,176.7	19.0	86.9	736.8	239.8	2,504.4	255.4	6,837.6	229.4	267.4
1,500 to 5,000	8,639.2	39.3	212.1	1,359.9	456.7	1,142.7	144.3	5,025.5	21.4	237.3
More than 5,000	5,023.1	62.5	382.3	1,159.7	248.9	693.0	52.7	2,267.1	—	661.0
All classes	24,839.0	120.8	681.3	3,256.4	945.4	4,340.1	452.4	14,130.8	250.8	661.0

'Sawtimber volume, International 1/4-inch rule.

Table 32. — Area of commercial forest land, by stand volume (cubic feet) and ownership classes, by physiographic classes, Georgia, 1972

Ownership class and stand volume per acre' (Cu. ft.)	All classes	Physiographic class								
		Deep swamps	Broad stream margins	Narrow stream margins	Mountain tops and slopes	Flatwoods and dry pocosins	Bays and wet pocosins	Rolling uplands	Sandhills	Other misc. classes
----- Thousand acres -----										
National Forest:										
Less than 500	58.6	---	---	0.3	45.4	---	---	12.9	---	---
500 to 1,000	159.3	---	---	2.0	97.8	---	---	50.8	---	8.7
More than 1,000	621.4	---	3.9	20.9	352.8	---	---	232.5	---	11.3
All classes	839.3	---	3.9	23.2	496.0	---	---	296.2	---	20.0
Other public:										
Less than 500	273.7	4.0	0.7	21.0	3.9	89.3	5.6	141.4	0.5	7.3
500 to 1,000	116.1	---	---	14.9	---	52.8	4.9	38.1	- -	5.4
More than 1,000	342.4	7.7	6.0	58.8	0.3	90.1	6.9	164.4	---	8.2
All classes	732.2	11.7	6.7	94.7	4.2	232.2	17.4	343.9	0.5	20.9
Forest industry:										
Less than 500	1,780.9	4.2	29.0	65.0	6.6	714.6	78.0	825.9	38.1	19.5
500 to 1,000	888.5	---	12.0	108.5	28.0	214.4	19.5	476.2	---	29.9
More than 1,000	1,648.8	22.2	204.3	260.3	10.9	354.3	31.5	684.7	---	80.6
All classes	4,318.2	26.4	245.3	433.8	45.5	1,283.3	129.0	1,986.8	38.1	130.0
Farmer and misc. private:										
Less than 500	5,378.5	---	29.8	298.8	79.9	1,154.3	141.6	3,347s	190.4	136.6
500 to 1,000	5,372.9	11.2	66.3	582.6	127.2	734.8	71.9	3,637.1	14.4	127.4
More than 1,000	8,197.9	71.5	329.3	1,823.3	192.6	935.5	92.5	4,519.7	7.4	226.1
All classes	18,949.3	82.7	425.4	2,704.7	399.7	2,824.6	306.0	11,503.9	212.2	490.1
All ownerships:										
Less than 500	7,491.7	8.2	59.5	385.1	135.8	1,958.2	225.2	4,327.3	229.0	163.4
500 to 1,000	6,536.8	11.2	78.3	708.0	253.0	1,002.0	96.3	4,202.2	14.4	171.4
More than 1,000	10,810.5	101.4	543.5	2,163.3	556.6	1,379.9	130.9	5,601.3	7.4	326.2
All classes	24,839.0	120.8	681.3	3,256.4	945.4	4,340.1	452.4	14,130.8	250.8	661.0

*Growing-stock volume.

Table 33. — Average net volume and growth per acre on commercial forest land, by physiographic class, tree class, and species group, Georgia, 1972

Physiographic class and tree class	Net volume per acre						Net growth per acre					
	Softwood		Hardwood		Total		Softwood		Hardwood		Total	
	<i>Cubic feet</i>	<i>Board feet</i>	<i>Cubic feet</i>	<i>Board feet</i>	<i>Cubic feet</i>	<i>Board feet</i>	<i>Cubic feet</i>	<i>Board feet</i>	<i>Cubic feet</i>	<i>Board feet</i>	<i>Cubic feet</i>	<i>Board feet</i>
Deep swamps:												
Growing stock	465.5	1,165	1,848.6	4,199	2,314.1	5,964	15.5	67	45.2	125	60.7	192
Rough and rotten trees	66.4	—	341.0	—	407.4	—	0.7	—	4.2	—	4.9	—
Total	531.9	1,765	2,189.6	4,199	2,721.5	5,964	16.2	67	49.4	125	65.6	192
Broad stream margins:												
Growing stock	295.8	1,301	1,521.7	4,920	1,817.5	6,221	12.6	64	45.8	162	58.4	226
Rough and rotten trees	13.2	—	295.5	—	309.1	—	0.2	—	5.2	—	5.4	—
Total	309.0	1,301	1,817.6	4,920	2,126.6	6,221	12.8	64	51.0	162	63.8	226
Narrow stream margins:												
Growing stock	444.6	1,752	962.6	2,536	1,407.2	4,288	25.0	111	35.2	111	60.2	222
Rough and rotten trees	5.6	—	213.1	—	218.7	—	0.2	—	4.2	—	4.4	—
Total	450.2	1,752	1,175.7	2,536	1,625.9	4,288	25.2	111	39.4	111	64.6	222
Mountain tops and slopes:												
Growing stock	316.8	1,070	873.4	2,465	1,190.2	3,535	19.2	66	30.5	96	49.7	162
Rough and rotten trees	10.0	—	277.0	—	287.0	—	1.6	—	5.4	—	7.0	—
Total	326.8	1,070	1,150.4	2,465	1,477.2	3,535	20.8	66	35.9	96	56.1	162
Flatwoods and dry pocosins:												
Growing stock	700.9	2,096	106.1	240	807.0	2,336	55.9	200	4.3	10	60.2	210
Rough and rotten trees	4.1	—	41.7	—	45.8	—	0.5	—	0.8	—	1.3	—
Total	705.0	2,096	147.8	240	852.8	2,336	56.4	200	5.1	10	61.5	210
Bays and wet pocosins:												
Growing stock	424.4	1,358	318.8	556	743.2	1,914	25.5	93	11.4	17	36.9	110
Rough and rotten trees	10.5	—	102.2	—	112.7	—	0.5	—	1.7	—	2.2	—
Total	434.9	1,358	421.0	556	855.9	1,914	26.0	93	13.1	17	39.1	110
Rolling uplands:												
Growing stock	637.4	1,881	308.3	706	945.1	2,587	54.2	179	14.8	41	69.0	220
Rough and rotten trees	10.5	—	63.8	—	74.3	—	1.4	—	1.9	—	3.3	—
Total	647.9	1,881	372.1	706	1,020.0	2,587	55.6	179	16.7	41	72.3	220
Sandhills:												
Growing stock	124.8	374	35.1	83	159.9	457	11.2	34	1.9	3	13.1	37
Rough and rotten trees	1.8	—	41.5	—	43.3	—	—	—	0.9	—	0.9	—
Total	126.6	374	76.6	83	203.2	457	11.2	34	2.8	3	14.0	37
Other misc. classes:												
Growing stock	751.0	2,211	572.8	1,260	1,323.8	3,471	32.4	127	16.0	46	48.4	173
Rough and rotten trees	12.1	—	147.3	—	159.4	—	0.4	—	2.4	—	2.8	—
Total	763.1	2,211	720.1	1,260	1,483.2	3,471	32.8	121	18.4	46	51.2	173
All classes:												
Growing stock	594.6	1,838	438.3	1,069	1,019.9	2,907	46.0	161	17.1	50	63.5	211
Rough and rotten trees	36.6	—	40.3	—	76.9	—	1.4	—	2.2	—	3.2	—
Total	603.6	1,838	523.4	1,069	1,127.0	2,907	47.4	161	19.3	50	66.7	211

Table 34. — Land area, by class, major forest type, and survey completion date, Georgia, 1953, 1961, and 1972

Land use class	Survey completion date			Change 1961-1972
	1953	1961'	1912	
. . . Thousand acres . . .				
Forest land:				
Commercial forest land:				
Pine and oak-pine types	15,883.0	16,795.5	16,468.0	-327.5
Hardwood types	8,086.1	8,992.6	8,371.0	-621.6
Total	23,969.1	25,788.1	24,839.0	-949.1
Noncommercial forest land:				
Productive-reserved	17.7	35.4	383.7	+348.3
Unproductive	69.8	25.9	30.2	+ 4.3
Total	87.5	61.3	413.9	+352.6
Nonforest land:				
Cropland	9,703.0	6,943.5	6,279.7	-663.8
Pasture and range	1,648.9	2,522.5	2,825.7	+ 303.2
Other	1,790.8	1,811.4	2,670.9	+859.5
Total	13,142.7	11,277.4	11,776.3	+498.9
All land ²	37,199.3	37,126.8	37,029.2	- 97.6
*These figures differ slightly from reported figures because of revisions in the estimates of land area.				
*Excludes all water areas.				

¹These figures differ slightly from reported figures because of revisions in the estimates of land area.

²Excludes all water areas.

Table 35. — Volume¹ of sawtimber, growing stock, and all live timber on commercial forest land, by species group, diameter class, and survey completion date, Georgia, 1953, 1961, and 1972

Species group	Year	All classes	Diameter class (inches at breast height)								
			5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0 and larger
SA WTIMBER (In million board feet, International 1/4-inch rule)											
Softwood	1953	32,596.5	---	---	8,850.5	9,643.6	6,413.5	3,652.5	1,883.6	969.9	1,182.9
	1961	34,356.9	---	---	9,367.6	10,112.1	6,773.2	3,886.0	2,048.7	1,125.3	1,044.0
	1972	45,654.9	---	---	10,500.0	12,282.1	9,836.4	6,282.1	3,305.4	1,705.4	1,743.5
Hardwood	1953	21,401s	---	---	---	4,345.7	4,733.8	3,590.8	2,780.9	1,926.1	4,024.2
	1961	20,781.5	---	---	---	4,759.7	4,784.0	3,413.9	2,642.1	1,922.0	3,259.8
	1972	26,543.8	---	---	---	5,758.0	5,945.9	4,793.2	3,286.4	2,271.5	4,488.8
GROWING STOCK (In million cubic feet)											
Softwood	1953	10,308.9	1,294.4	1,943.6	2,361.9	2,087.2	1,242.8	661.9	339.1	171.1	206.9
	1961	11,211.5	1,592.0	2,173.8	2,504.8	2,184.5	1,311.8	698.4	368.0	196.8	181.4
	1972	14,768.7	2,261.7	2,788.6	2,830.9	2,666.5	1,906.2	1,128.6	590.9	296.6	298.9
Hardwood	1953	8,190.8	762.0	1,100.2	1,411.7	1,298.0	1,152.5	762.3	549.8	365.9	788.4
	1961	8,372.3	922.3	1,217.0	1,401s	1,415.5	1,162.1	126.3	526.5	365.9	635.2
	1972	10,863.3	1,160.3	1,516.2	1,752.9	1,708.1	1,445.8	1,015.3	655.9	434.0	874.8
ALL LIVE TIMBER (In million cubic feet)											
Softwood	1953	10,452.3	1,331.8	1,978.8	2,390.3	2,099.7	1,251.x	664.4	331.4	173.9	220.2
	1961	11,371.7	1,639.4	2,214.4	2,536.1	2,198.6	1,321.2	700.7	370.5	199.5	191.3
	1972	14,992.7	2,327.1	2,848.0	2,871.6	2,685.3	1,920.5	1,132.6	594.1	300.0	312.9
Hardwood	1953	10,132.3	1,073.6	1,435.7	1,706.1	1,523.1	1,323.5	885.8	653.2	447.1	1,084.2
	1961	10,321.9	1,293.3	1,577.9	1,688.7	1,653.2	1,332.1	841.5	624.2	444.3	866.7
	1972	12,998.8	1,618.1	1,958.3	2,105.0	1,990.9	1,654.6	1,172.8	777.5	528.9	1,195.7

¹In order to provide a basis for valid comparisons, adjustments have been made to allow for differences in volume tables and sawtimber specifications used in previous surveys.

Table 36. — Volume of all live timber, by species group and Survey Unit, Georgia. 1953, 1961, and 1972

Species group and Survey Unit	1953	1961	Change 1953-1961	1972	Change 1961-1972
	<i>Million cu. ft.</i>	<i>Million cu. ft.</i>	<i>Percent</i>	<i>Million cu. ft.</i>	<i>Percent</i>
Softwood:					
Southeast	4,550.9	4,466.7	- 1.9	4,720.3	+ 5.7
Southwest	1,491.6	1,362.6	- 8.6	1,861.2	+ 36.6
Central	2,485.3	3,188.4	+ 28.3	4,359.9	+ 36.6
North Central	1,130.0	1,402.1	+ 24.1	2,466.7	+ 75.9
North	794.5	951.9	+ 19.8	1,588.6	+ 66.9
All units	10,452.3	11,371.7	+ 8.8	14,992.7	+ 31.8
Hardwood:					
Southeast	3,025.0	2,825.8	- 6.6	3,292.5	+ 16.5
Southwest	1,224.6	1,099.4	- 10.2	1,227.9	+ 11.7
Central	1,278.2	1,565.9	+ 8.6	2,181.7	+ 29.9
North Central	1,278.2	1,565.9	+ 22.5	2,181.7	+ 39.3
North	1,814.3	1,801.2	- 0.7	2,362.3	+ 31.2
All units	10,132.3	10,321.9	+ 1.9	12,998.8	+ 25.9

Knight, Herbert A., and McClure, Joe P.

1974. Georgia's timber, 1972. Southeast. Forest Exp. Stn., USDA Forest Serv. Resour. Bull. SE-27, 48 pp.

The fourth survey of Georgia's timber resource, completed in November 1972, shows improved timber supplies across most of the State since 1961. Inventory volume increased from 19.6 to 25.3 billion cubic feet, or by 29 percent. A group of counties south of the Altamaha river in Southeast Georgia was the only extensive area which experienced a reduction in timber volume. The rate of net annual growth increased by 50 percent to an average of 63 cubic feet per acre of commercial forest. In 1971, timber growth exceeded removals by almost 55 percent. Some 2 million acres of commercial forest were diverted to other land uses, but only about 1 million acres of new forest were added, which reduced the timber base from 25.8 to 24.8 million acres, or by 3.7 percent.

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